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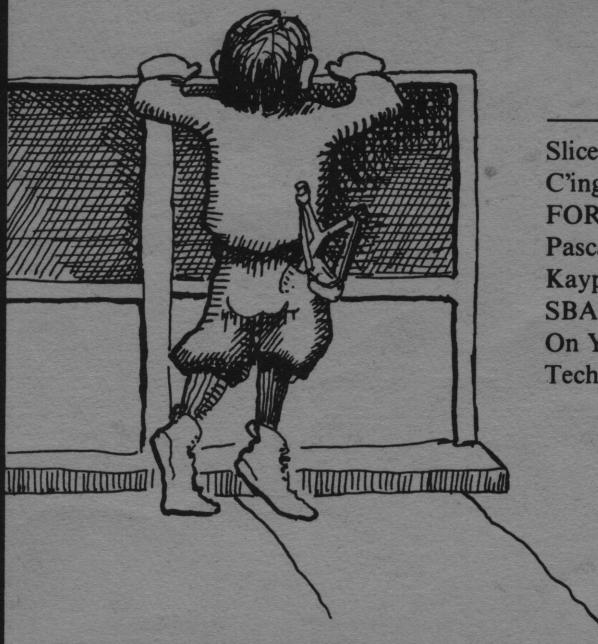


December 1983

No. 15

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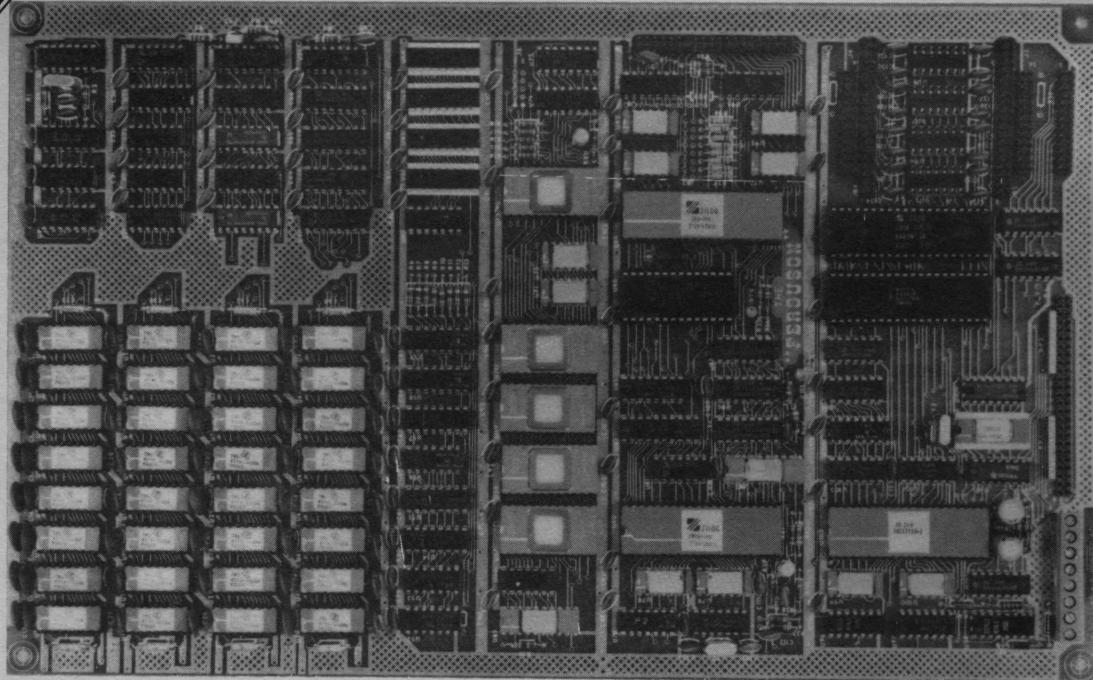
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MICRO CORNUCOPIA

December 1983 The Single Board Systems Journal No. 15



Son of a Big Board!

Genealogy

The following is for all you computer genealogy buffs—that is, of course, those of you who are interested in the genealogy of your computer.

In the beginning there was the Big Board (BB I). The hardware was designed by Jim Ferguson, the software by Russell Smith (often referred to as the Ferguson and Smith gang). The BB I was announced in the summer of 1980 at a kit price of \$649. Jim Tanner of Digital Research Computers of Texas—not to be confused with Digital Research of California—handled marketing, sales, and support.

The initial reaction by the S-100 buffs was that the BB I couldn't be a serious product. After all, what if you wanted to add another port or some more RAM? (And besides, S-100 systems even had their own magazine called S-100 Microsystems.)

Xerox 820

However, during the Fall of 1980 (as opposed to the rise of 1980) Xerox purchased rights to manufacture the Big Board and put it inside their 820. Xerox knew that IBM was working on a micro so Xerox wanted to get their own system onto the market VERY quickly.

The original 820 sold very well the first few months as independent software and hardware designers bought the new system and checked it out for potential new products. The 820 definitely needed some help. It didn't include much software, it had single-sided single-density 5" drives (unless you paid a gob extra for single-density 8"), and it ran at 2.5 MHz.

Information about the system was nonexistent. Xerox engineers had a very bad case of "not invented here" so they

acted as though the 820 didn't exist. Because the 820 was a very close copy of the BB I, some of us knew where to get information (many Xerox dealers had to service the 820 using only the \$5.00 BB I documentation package from DRC of Texas.)

I contacted Xerox marketing and engineering about supporting technical folks via Micro C. The answer from marketing was a resounding silence. Engineering wasn't so subtle. The engineering manager told me that I was not to speak to any of his engineers. (And then, what hurt most of all, he told his engineers that they weren't to speak to me.) Xerox was very concerned that someone might discover the genealogy of the 820.

Xerox had hired Jim Ferguson to help them with system configuration details but the company refused to listen when Jim suggested that they go to 4 MHz and double density. Much later, the 820-II came out with 4 MHz and double density. Surprise!

Xerox had high hopes for the 820 so they manufactured a whole scad of boards and shipped off thousands of systems to their official distributor, Hamilton Avnet. The rumor has it that two years later, Hamilton Avnet was still sitting on over 10,000 820-1s. (Not exactly the cushiest thing to sit on.)

Anyway, the independent software and hardware folks got tired of trying to pry information out of Xerox (and sales of the 820 were struggling, partially because of lack of independent software and hardware) so they looked around for another system to support.

Kaypro

Meanwhile, Non Linear Systems, a small manufacturer of digital meters, purchased two Big Boards. Lo and behold there soon appeared the KayComp computer. They used that name until the original owner of "KayComp" found out about Non Linear. So, the name became Kaypro II.

The Kaypro II is a Big Board with a few modifications (actually more modifications than Xerox made). Non Linear used eight 64K bit RAM chips instead of

(continued on page 42)

LETTERS

Dear Editor,

I am writing you to let you know that I highly recommend Cascade Electronics to Micro C readers. Dave and Kathy Garner provide excellent service.

A couple of us got six of their Shugart SA800-2 eight inch disk drives at about \$100 each. They arrived promptly and were in excellent shape. In fact, they were immaculate. We have been running some of the drives 8 to 10 hours a day since April and they have been quite dependable.

Anyone needing disk drives, blank disks, power supplies, or enclosures should get a hold of them. Dave and Kathy sell quality merchandise and are really nice people to deal with.

Contact them at Cascade Electronics, Rt. 1 Box 8, Randolph, Mn. 55065, 507-645-7997.

Alan Gomes
14612 San Bruno Drive #3
La Mirada, CA 90638

Editor's note:

Amen! I got some of their two-drive cabinets with power supplies as well as their 8" drives. Everything I've received has been as good or better than advertised and service has been excellent.

Also, thanks, Alan for the letter. It's not very often that someone takes the time to write about good service, usually I hear from people after they've been royally (or unroyally) bushwhacked.

Dear Editor,

I would like to suggest an extension to William King's article on page 4 of issue #14. Readers should do two patches to the BB II monitor.

At address F324H, change the 60H to 68H. At address F32AH change the 40H to 48H.

These patches set the H bit in the STEPIN & STEPOUT commands, so that the heads remain loaded during seeks. Otherwise the head will chatter during some seeks.

Alex Cameron
14A Somers Ave
Malvern, Victoria 3144 Australia

Dear Editor,

I have had some success doing word processing for fellow students here in Bellingham, Washington. I charge \$1.50 per page and give my customers a rough draft to edit. It seems expensive to many people but they can't beat the quality. My Kaypro and TP-1 printer really do a good job. I'm looking for a Gemini-10 printer for the rough drafts.

KKey is not all it's cracked up to be. The commands to alter CP/M don't always work. If you set it to load a program on a cold boot (but not on warm boots) it will load the program on all boots, so you can't get back to CP/M. Also, it sometimes sends my system out to Sunday lunch with no warning and it doesn't do keypad redefinitions. I have heard from another group that KKey is good but I've had nothing but problems with it.

Norman Bruland
1409.5 Harris Ave
Bellingham, WA 98225

Editor's note:

One of your readers said that "everything else gets second priority when I find Micro C in my mailbox." I can understand that. I grabbed your pub as I walked in from work one evening, then sat down and started reading. My wife joked, "I can handle your ignoring me now but if you bring that magazine to bed . . ." I accepted the hint and removed the copies of Micro C from my nightstand.

After all, one must draw the line when it affects one's marriage. I put them on her side.

On a less significant note, I'm still having problems making my Shugart 851 double sided 8" drive look like two drives to the Big Board. You and DRC's folks make it sound very simple so I must be missing something.

By the way, the utility on User's disk #11 for configuring the Okidata 92 works great. It supports almost all the optional output formats and is simple to use. If folks are interested, I would be willing to write a utility to download graphics from a Heath terminal to the uL92.

Bernie Lannan
536 "E" St
Robins Air Force Base, GA

Editor's note:

I don't know whether to offer my condolences to your wife or to you. What if she too finds Micro C habit forming? Where will you keep the magazines then? If it's between you,

let me know right away. It would be the first diagnosed case of multi-cornucopia (if the sound of that doesn't send chills down your doctor's spine, then he has no backbone). Because it is relatively new (no cases yet), there is no known cure (except, of course, expiration which is the ultimate cure, and too horrible to even consider).

Your Shugart should have a jumper option that lets it respond when either of two drives are selected. One side of the disk becomes one drive, the other is on the reverse side.

Note, that you must have a double-sided disk (the index hole is offset farther) to be able to access the back side (unless there is another option that lets the drive access the back side of a single-sided disk).

You will also have to format the back side—in a double-sided drive that looks like two drives—before you can access it. Formatting the disk in any other environment won't work.

Dear Editor,

After reading all the back issues of Micro C (and enjoying each one) I became somewhat overwhelmed by all the modifications your readers have submitted for the BB I.

In view of your background and experience, I would appreciate your suggestions on which modifications you would do if you were building a BB I and it were going to be your only system for a while.

Chris Paulsen
1138 E Electra Ln
Sandy, UT 84070

Editor's note:

Dana and I are building up a BB I system at this very moment (our third) and I'll tell you what we're doing to it (and in what order) in case you're doing a little at a time.

First, we will install the new character ROM (version 2.3). I refuse to look at the old characters.

Second, we will be doing the 4 MHz upgrade (we will use Otto Hiller's mod from Issue #2, page 3 and we will get the 16 MHz clock from the SWP dual density board). If I weren't planning to add the dual density board and I didn't want to spend much money, I'd go to issue #4 page 9 and do the 3.5 MHz mod (a Z80A processor might be the only part you'd need to purchase). If I were feeling rich, I'd do the 5 MHz mod with all Z80B parts and 150 ns RAM. (I'd be sure to read the Editor's note on that page, especially since I wrote it.)

Finally, of course, I will be adding the SWP dual density board. It halves the data access time and, of course, more than doubles the

amount of data on a disk. Great upgrade for the BB I.

I'd consider this a basic system (assuming two 8" Shugart or Siemens drives in a simple cabinet like the ones from Oddball or Cascade Electronics). Don't scrimp on the keyboard unless you hunt and peck with a sledge. The keyboard and the monitor (and character set) can really make or break an otherwise good system. (I like my BMC green and USI PI-3 amber monitors.)

Other goodies that I'd add if there were money and time include—the EPROM programmer from Issue #6, a third drive, and the Dyna RAM disk package from LA Software or the Co-Power board from SWP (it has a RAM disk built in).

Dear Editor,

I am building a BB II from bare board and plan on using it in my MSCS research project (designing a graphics editor).

I would like to get into contact with other BB II owners so we can exchange hints and kinks. It would be great if they had access to a UNIX system so we could correspond by UNIX mail.

George Wilder
2 S 445 Cherice Dr
Warrenville, IL 60555
312-979-0817 work

Dear Editor,

I fixed the shift-lock problem in the PFM monitor. I put 18H (jump rel) at address F449H (was a 20H). This change forces the monitor to jump over the shift lock function.

The best change I made to my system, however, was the video wiggle fix by Darrell Collins in Issue #13 (page 36). This simple fix really put the video wiggle problem to bed for good. Darrell should give himself a pat on the back for coming up with this one!

Bryan Johnson
234 Ave Santa Barbara
San Clemente, CA 92672

Editor's note:

Your shift-lock fix is good for those who don't want the shift but do want to send nulls to programs etc. Those who would rather have their systems throw away nulls should, instead, change location F44BH from 34H to 00H.

The trick to translating the RAM address into the equivalent spot in ROM, is to subtract F000H and add 10H. So, the data in F44BH (in RAM) came from 045BH in the ROM.

Dear Editor,

I hate to be a spoil sport, but I think it's important so here goes. I got the schematics of the Kaypro II and they are very readable. However, the draftsman shows +5V as a signal ground symbol. The correct symbol should be a line, a circle, or an arrow.

Question: where do I get the rest of the schematics, such as power supply, CRT display, and drives? Back in the olden days, schematics for radios and TVs were hard to come by, but it wasn't long before you could get all the information from Sam's. Computers aren't there yet.

Harvey DeGering
1245 East Washington Blvd
Pasadena, CA 91104

Editor's note:

I agree with both your concerns regarding the lack of schematics and the lack of standardization of schematic symbols.

Actually, the up-arrow we used is probably the most standard way to signify +5V. The problem we faced trying to provide schematics for the other components on the Kaypro is that only the disk drives came from one source (and the circuit on the drives has changed). The power supplies and the CRT monitors came from innumerable sources and I'm not sure that even Kaypro could translate a serial number into a particular monitor or power supply.

Also, computer companies are very secretive about their circuits (especially when they are first released). Sam's simply reproduces the circuit diagrams and information provided by the TV and radio manufacturers. That, obviously won't work when many companies are trying to keep the general public from getting schematics.

Dear Editor,

I have two complaints with Micro C. One, it is late (and getting later) and two, the Xerox 820 column was discontinued. I can't believe there is nothing to write about. Some topics I'd like to see are: composite video interface and what bugs we will encounter when using the 820.

Michael Miller
(No address on note)

Editor's note:

I didn't stop the Xerox 820 column; John Marlin stopped writing it and no one else has taken it on. We are now paying our columnists \$50 per column. I'd like to hear from anyone who would like to take on the Xerox 820.

Yes, there is a LOT of similarity between the two systems. 820 owners are using the

PFM monitor listing in issues #1 and #2 as a guide when they disassemble the monitor in the 820. Disk formatters, serial print drivers, modem software, and the EPROM programming package run on the 820. All these programs are very machine specific so essentially any software should run identically on both systems. However, there is no reason that Xerox 820 owners (as well as BB I and Kaypro owners) wouldn't benefit from a regular 820 column.

For a composite video adaptor, check this issue.

```
0  GOTO 100
10 KILL "<PROGRAM_NAME>.BAK"
20 NAME "<PROGRAM_NAME>.BAS" AS
      ↗ "<PROGRAM_NAME>.BAK"
30 SAVE "<PROGRAM_NAME>.BAS"
40 PRINT "<PROGRAM_NAME>.BAS SAVE AND
      ↗ BACKED-UP"
50 END
100 REM BEGIN PROGRAM HERE
```

Figure 1 - Your BASIC Back-up Program

Dear Editor,

5 MHz is really great! I made the drive fix from issue 11 and speeded up my Kaypro and everything worked perfectly!

I compiled a little program in JRT Pascal. It took 55 seconds at 2.5 MHz and 40 seconds at 5 MHz (not half the time because of the disk accesses). Then I ran a test of prime numbers; lo and behold, the slow clock took 78 seconds, the fast took only 40. This is Great!

I found that I could plug a wire into U86's socket (where pin 4 used to reside) rather than soldering a wire to resistor R26. Radio Shack's ribbon cable has the right size conductor to plug into the socket. All in all, the instructions were very clear and the whole conversion (including disk timing, ROM monitor, and speed) took about 90 minutes.

Also, I discovered a little trick in BASIC. You see, MBASIC does not create a backup file when you save the program you are working on. So, I use the following code at the beginning of every program. (See Figure 1.)

To save your program the first time, enter RUN 30, then RUN 20 (avoids the "no file" error message). After that, simply enter RUN 10. If you simply enter RUN, then this program is bypassed and the main program is run.

Dave Truckenmiller
501 S Bennett
Palatine, IL 60067

(Letters continued on page 36)

Dumping the Screen on a BB I

By Glenn McEowen

5904 Waits Ave.
Fort Worth, TX 76133

Being your standard, card-carrying, low-budget tightwad, I was interested by Micro C's offer of a user disk for an article or a bit of software. Surely, I could write some dinky trifle that would qualify for a free disk!

Here, after many many hours of effort, is that "trifle." You may think it's a trifle too, but let me assure you, it turned into a major project!

It all started when I saw a nifty feature on an IBM small system computer (5120, system 23). This unit had a key that dumped the screen to the printer. So why couldn't I dump my Big Board screen too?

Introducing the Scroll Register

It should be easy: just get a byte from the screen memory and send it via BDOS to the LST: device. Not so simple, I soon found out. Mr. Ferguson, bless his heart, didn't want to bore us with simple screen memory addressing, so he threw in the scroll register to keep the screen guessing where its next byte was coming from. (That ridiculous little pun was truly an accident.) (*Editor's note: I'll bet!*)

Anyway, I had to uncalculate where the order of things in order to dump to the printer.

How It Works

Running SCRNDUMP.COM loads the program into an unused cranny in high memory and then warm boots the system. Now, whenever you want to copy the screen to the printer, you simply enter a cntl-W. Immediately, the LST: device starts receiving data. When it's finished, you are returned to your original program right where you left off.

When called by a cntl-W, SCRNDUMP first saves the registers, then proceeds to calculate the beginning screen RAM address after doing some fancy mathematical gymnastics with the scroll register. Finally, with the first address in hand, it bank switches to the screen RAM, reads the first byte, bank switches back, and sends the byte to CBIOS :LST routine.

One of my griefs with the program is that it could not simply send the byte to :LST through BDOS, but usually SCRNDUMP is called from BDOS and the re-entrant problem was more than I could tackle. Anyway, the CBIOS jump vector

```
;*****  
;* SCRNDUMP.MAC: A screen dump to :LST device for *  
;* the Big Board *  
;* by Glenn McEowen 7/25/83 *  
;*****  
.  
Title Scrndump.mac  
.280  
;  
Equates  
DA00 DOSLC EQU ODA00H ;Location 59.5K DOS  
E80F BIOSLST EQU DOSLC+0E00H+0FH ;Jump vector in CBOIS to :LST  
0000 WBOOT EQU 0 ;C/PM warm boot  
000D CR EQU ODH ;Carriage return  
000A LF EQU OAH ;Line feed  
0017 CHAR EQU 017H ;Dump character Cntl-W, activates  
F009 CONIN EQU 0F009H ;"dump" to the :LST device  
;Monitor location for console input  
;routine which is over-written by  
;SCRNDUMP  
F009 CNOVL EQU CONIN ;Overlay routine  
3000 CRTMEM EQU 03000H ;Checks for Cntl-W  
FF77 BASE EQU 0FF77H ;Base of CRT ram  
001C BITDAT EQU 01CH ;Current contents of scroll register  
;System PIO port, for bank switching  
;to CRT ram  
FE00 SCRDMp EQU 0FE00H ;SCRNDUMP routine location  
FECE SCRSTK EQU SCRDMp+0CEH ;SCRNDUMP private stack  
F439 KBDIN EQU 0F439H ;Monitor's keyboard input routine  
0000' ASEG  
ORG 0100H  
;  
Relocate the SCRNDUMP routine to the high parts of RAM  
0100 11 FE00 INIT: LD DE,SCRDMp ;Load DE with pointer to bottom  
0103 21 011F . LD HL,SCRL ;of SCRNDUMP routine  
0106 01 00AA . LD BC,CON-SCRL-1 ;Load HL with pointer to data in  
0109 ED B0 . LDIR ;TPA  
010B 11 F009 LD DE,CNOVL ;DE points to the overwrite of  
010E 21 01CA LD HL,CON ;CONIN routine  
0111 01 0003 LD BC,SCREND-CON ;HL points to data to move  
0114 ED B0 LDIR ;BC has byte count  
0116 21 FEA8 LD HL,DCHAR ;Move it  
0119 3E 17 LD A,CHAR ;HL points to "dump" character  
011B 77 LD (HL),A ;location  
011C C3 0000 JP WBOOT ;A gets the character  
011F SCRL: .PHASE SCRDMp ;Go back to C/PM  
FE00 CD F439 SCRDMp: CALL KBDIN ;Get the character from keybd  
FE03 E5 PUSH HL  
FE04 21 FEA8 LD HL,DCHAR ;Check to see if it is the  
FE07 BE CP (HL) ;scrndump character  
FE08 E1 POP HL  
FE09 C0 RET NZ ;character is not equal to  
;";dump" character, so return  
;to caller  
FE0A ED 73 FEA9 SCR: LD (STSTOR),SP ;Save the SP  
FE0E 31 FECE LD SP,SCRSTK ;Assign the new stack ptr  
FE11 E5 PUSH HL  
FE12 D5 PUSH DE ;Save some things  
FE13 C5 PUSH BC  
FE14 DD E5 PUSH IX  
FE16 21 3C00 LD HL,CRTMEM+0C00H ;Get the top of screen ram  
FE19 3A FF77 LD A,(BASE)  
FE1C 47 LD B,A ;Set B to (BASE) for later  
FE1D FE 17 CP 017H ;Compare to max scroll count  
FE1F 20 0F JR NZ,SCRO  
FE21 21 3000 LD HL,CRTMEM ;HL is actual top of screen  
FE24 3E 01 LD A,01 ;Print 1 line before starting  
FE26 32 FEA7 LD (LCNT1),A ;at the top of CRTRAM
```

FE29	3E 18	LD	A,018H		
FE2B	32 FEA6	LD	(LCNT),A	;LCNT gets total lines/screen	
FE2E	18 13	JR	SCR2		
FE30	04	SCRO:	INC	;Scroll is not at max, so we	
FE31	3E 18	LD	B	must set up for rollover.	
FE33	32 FEA6	LD	A,018H	;LCNT gets total lines/screen	
FE36	90	SUB	B		
FE37	47	LD	B,A	;B has the line counter	
FE38	32 FEA7	LD	(LCNT1),A	;LCNT1 gets line counter, too	
FE3B	11 0080	LD	DE,080H	;DE gets ram "line length"	
FE3E	B7	OR	A	;Clear carry	
FE3F	ED 52	SBC	HL,DE	;Decerase CRT memory line by	
FE41	10 FC	DJNZ	SCR1	;line	
FE43	E5	SCR2:	PUSH	;HL now contains the START	
FE44	DD E1	POP	HL	;Put HL into IX to save it	
FE46	06 50	LD	IX	;Character counter in B (80d)	
FE48	F3	SCR3:	DI	;Make sure nothing happens	
FE49	DB 1C	IN	A,(BITDAT)	;Switch memory bank select	
FE4B	CB FF	SET	7,A		
FE4D	D3 1C	OUT	(BITDAT),A		
FE4F	4E	LD	C,(HL)	;Get the character from CRTRAM	
FE50	DB 1C	IN	A,(BITDAT)	;Switch memory bank back	
FE52	CB BF	RES	7,A		
FE54	D3 1C	OUT	(BITDAT),A		
FE56	FB	EI		;Interrupts back to normal	
FE57	23	INC	HL	;Ready for next character	
FE58	E5	PUSH	HL	;Save the CRTRAM pointer	
FE59	C5	PUSH	BC	;Save the character count	
FE5A	CD E80F	CALL	BIOSLST	;Go print the character	
FE5D	C1	POP	BC	;Get character counter back	
FE5E	E1	POP	HL	;Get CRTRAM pointer back	
FE5F	10 E7	DJNZ	SCR3	;Repeat until line is done	
FE61	CD FE9B	CALL	CRLF	;Output a CR and LF	
FE64	DD E5	NXTLN:	PUSH		
FE66	E1	POP	IX	;Get START back into HL	
FE67	3A FEA6	LD	HL		
FE6A	3D	DEC	A	;Let's see where we are	
FE6B	32 FEA6	LD	(LCNT),A		
FE6E	28 1C	JR	Z,FIN		
FE70	3A FEA7	LD	A,(LCNT1)	;If 0 we are done	
FE73	3D	DEC	A		
FE74	32 FEA7	LD	(LCNT1),A		
FE77	28 07	JR	Z,NXT1	;We're not to 3000h	
FE79	11 0080	LD	DE,080H		
FE7C	B7	OR	A	;Clear carry flag	
FE7D	19	ADD	HL,DE	;HL points to next line	
FE7E	18 C3	JR	SCR2	;Go do another line	
FE80	3A FF77	NXT1:	LD	A,(BASE)	
FE83	3C	INC	A	;Scroll register in A	
FE84	32 FEA7	LD	(LCNT1),A	;So last line is correct	
FE87	21 3000	LD	HL,CRTMEM	;Put it LCNT1 for dec's	
FE88	18 B7	JR	SCR2	;HL has start of CRTRAM	
				;Go do the last lines	
FE8C	CD FE9B	FIN:	CALL	CRLF	
FE8F	DD E1	POP	IX	;Do another CR	
FE91	C1	POP	BC	;Restore everything	
FE92	D1	POP	DE		
FE93	E1	POP	HL		
FE94	ED 7B FEA9	LD	SP,(STSTOR)		
FE98	C3 FE00	JP	SCRDMP	;Put the old stack back	
				;Done "dumping", get	
				;another character	
FE9B	0E OD	CRLF:	LD	C,CR	
FE9D	CD E80F	CALL	BIOSLST		
FEAO	0E OA	LD	C,LF		
FEA2	CD E80F	CALL	BIOSLST		
FEA5	C9	RET			
FEA6		LCNT:	DEFS	1	
FEA7		LCNT1:	DEFS	1	;Place to keep line counter
FEA8		DCHAR:	DEFS	1	;Place to keep sub-counter
FEA9		STSTOR:	DEFS	2	;Place to keep "dump" char
				;Store old stack pointer	
				.dephase	
01CA		CON:	.phase	CNOVL	
F009	C3 FE00	CNOVL:	JP	SCRDMP	
					;This segment overlays
					;the old CONIN jump vector
					;in the PFM monitor
				.dephase	
01CD		SCREND:	END		

entry proved a workable solution. So we send the byte to :LST then go back and get another.

When we reach the end of the line, we do a CRLF carriage return, line feed) and then go back to the calculations for the next line which may be in sequence or may not, depending on the scroll register.

When it finishes dumping the screen, SCRNDUMP outputs another CRLF for good measure, restores the registers, and returns to the caller, waiting patiently for another chance to perform.

More Boring Details

I chose to use cntl-W because it isn't used very often by other programs. (Unfortunately, Wordstar uses every control character.) Anyway, it's easy enough to change the character. (It's named CHAR and resides at FEA8H.)

The program lies in the unused (I hope) memory block between FE00 and FED0. It keeps its counters and its stack within the block.

SCRNDUMP also overlays the first 3 bytes of the monitor's CONIN routine (@F009) with a jump to SCRNDUMP at FE00. From here the buffer is read and tested for a cntl-W. If there is no match, the system continues as normal. If the character was a cntl-W, then the dump to LST: device starts. When the dump is complete, you are right back in your original program with no change to the screen.

I set the parameters to fit into the standard Big Board configuration with DRC's CBIOS and the 59.5K CP/M. You can alter it for different size systems by changing DOSLC, you can select a new control character by changing CHAR, and you can change the location of the program by changing SCRDMP. Then, of course you have to reassemble it. I used MicroSoft's M80 and L80 for the assembly.

SCRNDUMP has worked successfully from inside DDT, ZSID, a CB80 compiled program, CP/M's CCP, and even Wordstar (but I had to give up the upscroll which is cntl-W).

Editor's note: You Kaypro folks can modify this code for your system. The Kaypro Video is at the same location as the Big Board. The difference is that you don't have any free RAM at FE00 (You might try putting the program below the CCP) and you don't have a scroll register. So, the video RAM maps directly onto the screen, and you can remove the address calculations.



BB II Video Calculations

By Douglas H. Durland

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Palo Alto, CA 94306

The goal of this article is to help Big board II owners improve their video display.

Owners of the board who use the on-board video driver with the 9 by 11 character set soon discover that the 6845 controller programming which comes on the original monitor needs to be tuned up. Cal-Tex now supplies some suggestions for improvement, but they do not go far enough.

I'm going to discuss a few basics on how the 6845 works. Following these basics, there is a Pascal program that will calculate the values you need to program into the 6845 for your own monitor.

A Look at the 6845

The 6845 is basically a timing/synchronizing device which controls when the character data stored in the video RAM is presented to the 8002 output device, and it controls the timing of the horizontal and vertical sync pulses. It is this control of horizontal and vertical timing that we will look at here.

Registers

Register 0 controls the horizontal sync rate. Its contents are 1 less than the number of character times per horizontal line. Since a character time is 9 times the dot crystal period, the period between horizontal sync pulses can be calculated from the dot clock frequency and the contents of register 0.

Conversely, if you know the crystal frequency and the desired horizontal sweep rate (to match your monitor requirements) you can calculate the number you need in register 0.

Register 1 controls the number of characters to be displayed per line. It is usually set at 80.

Register 2 controls the timing of the H sync pulse with respect to the start of the line. This timing varies greatly for various monitors. This value does not affect the horizontal sweep rate.

Register 3 controls the width of the V and H sync pulses.

Registers 4 and 5 control the vertical timing.

Register 4 contains 1 less than the number of full lines per frame (a full line is 12 scan lines).

Register 5 lets you set the vertical

sweep rate very precisely. Its contents are the number of scan lines to be added to the full lines to produce the correct interval between V sync pulses.

Register 6 contains the number of character lines to be displayed. It is normally fixed at 24.

Register 7 controls the timing of the V sync pulse with respect to the first character line. Different monitors have quite different timing requirements. The contents of this register do not affect the vertical sweep RATE.

So much for the background. Now let's see what we can do with this information.

Original BB II

As BB II arrives, it is programmed for an 18.3 KHz H sweep rate, and a 55.9 Hz V rate. You can prove this to yourself with the Pascal program.

The horizontal position (register 2) will generally place some of the data off the right hand side of the screen. This is easy to change, but other modifications aren't so easy.

Let's assume you have purchased a

monitor with a nominal 18.6 KHz horizontal sweep. Unless it is awfully well shielded, you'll find you have a 4 Hz swim (the vertical scan rate is about 4 Hz less than 60 Hz).

So you try to get rid of the swim by tweaking registers 4,5, and 6. If you are lucky you get a vertical of 60.09 Hz, and don't see any swim.

Unfortunately, you can't count on being lucky. My first experience was with a Motorola 3003 (an excellent monitor!). My drives are right next to it, and the swim was unacceptable.

When I programmed the 6845 for a 60 Hz sweep, the swim disappeared but I discovered that the resulting 97 character horizontal line did not allow enough time for horizontal retrace, and I was losing characters. OK, so up the horizontal character number and I tweaked some more.

Video Crystal Frequency

Nuts, it looked like I had to choose between 80 characters and swim. The video crystal frequency was too low! (I should pause at this point and mention

Figure 2 - Routine to Reprogram the 6845

```
; THIS PROGRAM OUTPUTS A GROUP OF BYTES TO THE 6845 CRT
; CONTROLLER ON BIGBOARD II. THIS PARTICULAR GROUP WORKS
; ON AN AMDEK 310 WITH A DOT CLOCK CRYSTAL OF 16 MHZ.
; THE RESULTING H FREQ IS 18.33 KHZ. THE V IS 60.09 Hz
;
; WRITTEN IN 8080 CODE SO IT CAN BE ASSEMBLED WITH ASM
;
; DOUG DURLAND 8-20-83
;
; ORG 100H
;
; LXI H, TABLE ; POINT TO 8 VALUES
; MVI C, 0 ; START AT REGISTER 0
; MVI B, 8 ; COUNT
; OUTLP: ; HOW'S THAT FOR AN ORIGINAL NAME?
;         MOV A, C
;         INR C ; DONT FORGET
;         OUT ODCH ; SELECT 6845 REGISTER
;         MOV A, M
;         INX H ; MAY AS WELL DO IT NOW
;         OUT ODDH ; PUT THE VALUE INTO IT
;         DCR B
;         JNZ OUTLP
;
;         JMP 0 ; BACK TO CP/M
;
; TABLE:
;         DB 96 ; 97 CHARACTERS TOTAL-1
;         DB 80 ; DISPLAY 80
;         DB 83 ; H SYNC POSITION
;         DB 28H ; SYNC WIDTHS
;         DB 24 ; 25 LINES TOTAL-1
;         DB 5 ; 5 EXTRA SCAN LINES
;         DB 24 ; DISPLAY 24 LINES
;         DB 24 ; V SYNC POSITION
;
; END
```

that further experience with other monitors—some Zeniths and an AMDEK 310—posed no problem at all. They worked just fine.)

I purchased an 18 MHz crystal (Cal-Tex ships a 16 MHz) and I finished the programming. It's obvious that an 18 MHz crystal will be needed fairly often.

If this whole process sounds like a pain in the you-know-what, you're right, it was!

But when other folks around here found out I had successfully interfaced different monitors to the BB II, they wanted to know how to do it. So I wrote this article and the following software.

If you enter your dot-clock crystal frequency, your nominal H scan frequency, and your local line frequency, it will tell you what values to put in your 6845. It will tell you when the solution is marginal and when there is no solution.

For example, those who wish to use standard monitors (15.75 KHz sweep) are going to have to settle for a slow vertical sweep rate. If you want 24 lines at 12 scans per line, there just isn't enough time in 1/60th of a second.

Doing the Calculation

Enter the calcbyte program which follows and run it under JRT Pascal vrs 3.0 (Editor's note: This program should be relatively easy to translate into another version of Pascal or into another language, that's the beauty of a very readable language like Pascal.)

Now run the program. If you find that you lose horizontal characters when you program the 6845 with the new values, then install an 18 MHz crystal.

There is an easier way to program the 6845 than outputting bytes from the console. Make yourself a .COM file which outputs the group. You can play with it with DDT while you are experimenting with the values. I have included an assembly language routine which works for an AMDEK 310 with the original 16 MHz crystal, so you can try it out. It assembles under ASM. See Figure 2.

I hope this will help all of you get a rock solid and beautiful display on this great computer.



Figure 1 - JRT Pascal Program to Calculate 6845 Values

```
program calcbytes;
{ This program compiles and runs under JRT Pascal version 3.
  Its purpose is to permit interactive development of an optimum
  set of bytes to be programmed into the 6845 CRT controller which
  is used on the BIGBOARD II.

  Doug Durland
  663 Georgia Ave.
  Palo Alto, CA 94306 }

type
  double = array[1..2] of char;

var
  answer : char;

  xtal_frequency, monitor_frequency, character_time,
  line_time, actual_h_freq, actual_v_freq : real;

  nmbr_of_characters, number_of_lines, vertical_correction,
  vertical_total, power_line_frequency : integer;

function get_char : char;
var r : record
  flag,a,c,b,e,d,l,h : char;
  end;
begin
  r.c := chr(1);
  call (5,r,r);
  get_char := r.a
end;

function hexint (x:integer) : double;
var
  digit_value : array[1..2] of integer;
  i : integer;

begin {converting to hex}
  digit_value[1] := x div 16;
  digit_value[2] := x mod 16;
  for i := 1 to 2 do
    if digit_value[i] < 10
    then
      hexint[i] := chr(digit_value[i] + ord('0'))
    else
      hexint[i] := chr((digit_value[i]-10) + ord('A'))
  end;
end;

procedure do_the_work;
begin
  write ('enter your crystal frequency in MHz ');
  readin (xtal_frequency);
  write ('enter your monitor scan frequency in KHz ');
  readin (monitor_frequency);
  write ('what is your local power line frequency, in Hz? ');
  readin (power_line_frequency);
  nmbr_of_characters:=round(1000*xtal_frequency/(9*monitor_frequency));
  if nmbr_of_characters < 100
  then
    begin
      writeln;
      writeln ('Warning! This combination results in less than');
      writeln ('100 characters total, and may give trouble with');
      writeln ('inadequate retrace time with some monitors. Try');
      writeln ('to adjust your crystal/monitor scan combination to');
      writeln ('achieve at least 100 characters total.');
      writeln ('press <CR> to continue.');
    repeat
      answer := get_char
    until answer = chr(0dh);
  end;
end;
```

(Program continued next page)

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JRT Pascal Program to Calculate 6845 Values

(continued from page 7)

```

character_time:=9.0E-06/xtal_frequency;
line_time:=nmbr_of_characters*character_time;
number_of_lines:= round((1/power_line_frequency)/line_time);
vertical_correction:= number_of_lines mod 12;
vertical_total:= number_of_lines div 12;

if vertical_total < 25
then
begin
writeln;
writeln ('Warning! Cannot achieve desired vertical scan rate.');
writeln ('Proceeding on 25 line total basis. (24 displayed)');
writeln ('Press <CR> to continue.');
repeat
answer := get_char
until answer = chr(0dh);
vertical_total:=25;
number_of_lines:=12*25;
vertical_correction:=0
end;

actual_h_freq:= 1/(1000*line_time);
actual_v_freq:= 1/(number_of_lines*line_time);
writeln;
writeln ('crystal frequency=',xtal_frequency,' MHz');
writeln ('actual h freq.=',actual_h_freq:6:2,' KHz');
writeln ('actual v freq.=',actual_v_freq:6:2,' Hz');
writeln ('number of characters= ',nmbr_of_characters);
writeln ('vertical total= ',vertical_total);
writeln ('vertical correction= ',vertical_correction);
writeln;
write ('R0=',nmbr_of_characters-1:4);
write (' ',hexint(nmbr_of_characters-1),'H');
writeln (' ; number of characters/line-1');
write ('R1= 80');
write (' 50H');
writeln (' ; number of displayed char/line');
write ('R2= ',80+((nmbr_of_characters-80)div 2),'H');
writeln (' ; horizontal sync position (varies with monitor)');
write ('R3= 28H 28H');
writeln (' ; V sync length (2)/H sync width (8)');
write ('R4= ',vertical_total-1);
writeln (' ; character lines total-1');
writeln ('R5= ',vertical_correction:3);
writeln (' ; hexint(vertical_correction),'H');
writeln (' ; added scan lines to trim V frequency');
write ('R6= 24 18H');
writeln (' ; number of character lines displayed');
write ('R7= 24 18H');
writeln (' ; vertical sync position (varies with monitor)');
write ('R8= 0 0');
writeln (' ; no interlace and no skew');
write ('R9= 11 0BH');
writeln (' ; number of raster lines/char -1');
end;

begin {the repetitive part}

repeat
do_the_work;
writeln;
write ('Do you want to try other values? (y/n )');
readln(answer);
writeln;
until ((answer='n') or (answer='N'))

end.

```

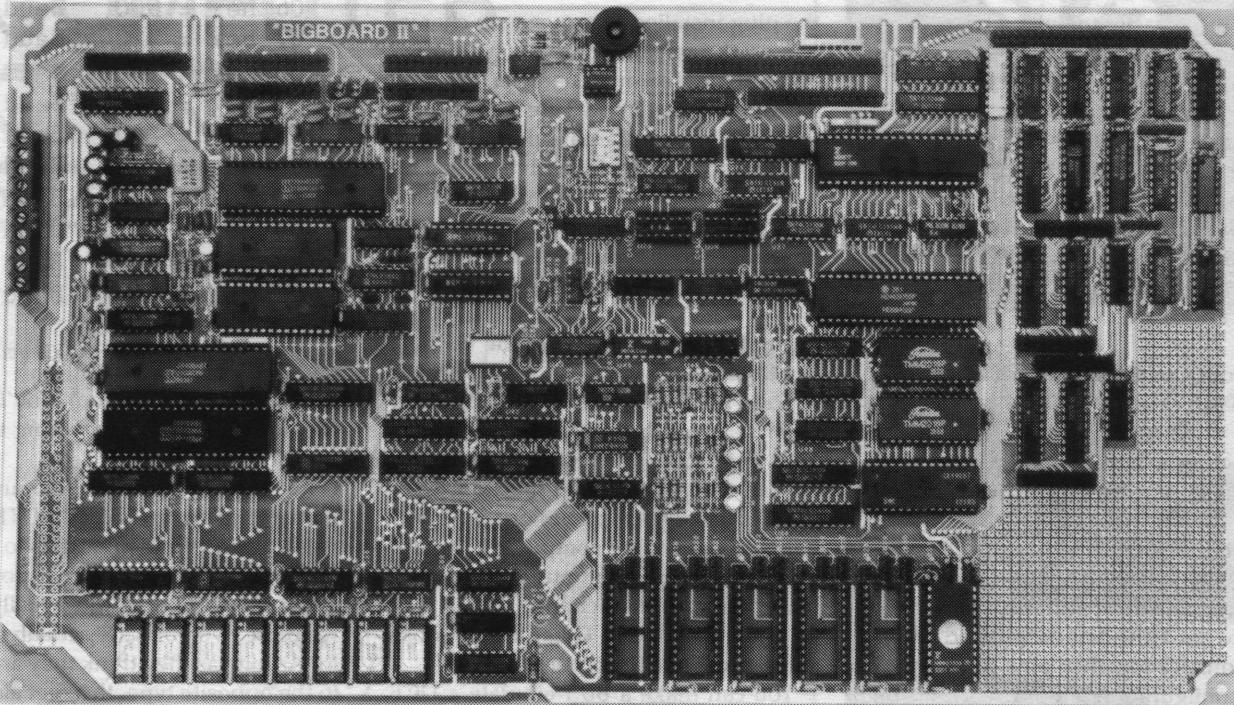
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■ 4 MHz Z80-A CPU and Peripheral Chips

The new Ferguson computer runs at 4 MHz. Its Monitor code is lean, uses Mode 2 interrupts, and makes good use of the Z80-A DMA chip.

■ 64K Dynamic RAM + 4K Static CRT RAM + 24K E(E)PROM or Static RAM

"Big Board II" has three memory banks. The first memory bank has eight 4164 DRAMs that provide 60K of user space and 4K of monitor space. The second memory bank has two 2Kx8 SRAMs for the memory-mapped CRT display and space for six 2732As, 2Kx8 static RAMs, or pin-compatible EEPROMS. The third memory bank is for RAM or ROM added to the board via the STD bus. Whether bought as a bare board, an "unkit", or assembled and tested, it comes with a 2732 EPROM containing Russell Smith's superb Monitor.

■ Multiple-Density Controller for SS/DS Floppy Disks

The new Cal-Tex single-board computer has a multiple-density disk controller. It can use 1793 or 8877 controller chips since it generates the side signal with TTL parts. The board has two connectors for disk signals, one with 34 pins for 5.25" drives, the other with 50 pins for 8" drives.

■ Vastly Improved CRT Display

The new Ferguson SBC uses a 6845 CRT controller and SMC 8002 video attributes controller to produce a display rivaling the display of quality terminals. There are three display modes: Character, block-graphics, and line-graphics. The board emulates an ADM-31 with 24 lines of 80 characters formed by a 7x9 dot matrix.

■ STD Bus

The new Ferguson computer has an STD Bus port for easy system expansion.

■ DMA

The new Ferguson computer has a Z80-A DMA chip that will allow byte-wise data transfers at 500 KBytes per second and bit-serial transfers via the Z80-A SIO at 880 Kbits per second with minimal processor overhead. When a hard-disk subsystem is added, the DMA chip makes impressive disk performance possible.

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■ Two Synchronous/Asynchronous Serial Ports

With a Z80-A SIO/O and a Z80-A CTC as a baud-rate generator, the new Ferguson computer has two full RS232-C ports. It autobauds on both.

■ A Parallel Keyboard Port + Four Other Parallel Ports for User I/O

The new Cal-Tex single-board computer has one parallel port for an ASCII keyboard and four others for user-defined I/O.

■ Two Z80-A CTCs = Eight Programmable Counters/Timers

The new Ferguson computer has two Z80-A CTCs. One is used to clock data into and out of the Z80-A SIO/O, while the other is for systems and applications use.

■ PROM Programming Circuitry

The new Cal-Tex SBC has circuitry for programming 2716s, 2732(A)s, or pin-compatible EEPROMs.

■ CP/M 2.2**

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* The "unkit" is a fully-socketed, wave-soldered "Big Board II". It requires NO soldering. All an "unkit" purchaser must do is carefully insert the prime ICs we supply in the proper sockets and systematically proceed to bring up and test the board.

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If Your Serial Port Isn't Feeling Its Oats

By John Allen

40 Rugg Road
Allston, MA 02134

It's often easier to build a board, connect up the power supply, the drives, the keyboard, and monitor than it is to connect up a simple peripheral via the "standard" RS-232 interface.

There are so many things that can go wrong that it's hard to tell whether a communications problem lies in the computer, the cable, or the peripheral. The following should make your diagnostic efforts a little easier.

Can Your Computer Speak RS-232?

You can easily check whether the system's serial port is working, without connecting a modem or printer to the port. You do this by connecting the port's output back to its input, so it talks to itself.

Take an RS-232 plug (usually a male will plug into your system) and connect pin 2 to pin 3 (the data output and input), and connect together pins 5, 6, and 8. This configuration should work on Big Boards set up with the DTE (T) jumpers and with Kaypros. DTE stands for Data Terminal Equipment or terminal for short.

If, on the other hand, your computer is set up to look like DCE (Data Communications Equipment—a modem), then you will still jumper pin 2 to pin 3, but the other three pins that you will connect together will be 4, 6, and 20.

Pin 6 supplies +12V so you are using it to pull up the handshaking pins 5 and 8 (DTE) or 4 and 20 (DCE). This high tells your system that it is OK to send data.

You can make up two plugs and check to see whether a port is set up as a DTE port or a DCE port. Whichever one works in the port tells you what kind of port you have (assuming the port works at all).

Running the Test

To test a port, install the new RS-232 plug, get into a modem program that has been configured for your system—Modem7, for instance. Enter "T" to get into terminal mode, then watch to see if the keys you type show up on the screen.

On some modem programs, there is an internal echo, on others there isn't unless you ask for it.

To find out which you have, temporarily disconnect pin 2 from pin 3, but leave

the plug installed. If you see no characters on the screen when you type, then you should see one character for each keystroke when 2 and 3 are reconnected (you don't have internal echo).

If you see a character each time you hit a key while 2 and 3 are disconnected then you should see 2 characters for each keystroke when they are reconnected (if your serial port is talking, that is).

Easier Communications for the Big Board

The "Talking Serially" article in Micro C #9 tells you how to transpose signal lines in an RS-232 cable so two computers can talk. I have used this approach, but it is usually simpler to use the internal jumpers. If one computer is configured as DTE (most computers are configured this way) then change the BB (I or II) to emulate DCE. Thus, the BB looks like a modem to the other machine.

You can make a BB I emulate a DCE port by jumpering pins 5-6, 9-10, 13-14, 17-18, 21-22, and 25-26 on JB4 or JB5. On JB4 (port A) you will also need to jumper pins 31-32 and 35-36 (provide the clock to the SIO). On JB5 (port B) these extra clock jumpers aren't used.

BB II jumpers are similar; consult the BB II documentation.

Anyway, once you have reconfigured the BB as a DCE serial port, you can talk to just about any other system using a straight cable in which no signals are transposed.

One system you can't talk to, however, is the Osborne. The Osborne was told at birth that it was a modem (probably

00 hex =	50	Baud
01 hex =	75	Baud
02 hex =	110	Baud
03 hex =	134.5	Baud
04 hex =	150	Baud
05 hex =	300	Baud
06 hex =	600	Baud
07 hex =	1200	Baud
08 hex =	1800	Baud
09 hex =	2000	Baud
0A hex =	2400	Baud
0B hex =	3600	Baud
0C hex =	4800	Baud
0D hex =	7200	Baud
0E hex =	9600	Baud
0F hex =	19.2K	Baud

Figure 1 -
Baud Rate Generator Control Characters

explains the small screen). You'll have to go back to the DTE jumpering to talk to an Osborne.

As you can probably see, an RS-232 port that is configured as a DTE port (it thinks it is a terminal) expects to communicate with an RS-232 DCE port (looks like a modem). It doesn't really matter what the two ports are actually attached to. As long as they think they are talking to the opposite type, they get along fine. (No different than people at a party.)

Talking Fast

Once you have two systems talking (both using modem7 or the like which checks for errors), then try raising the baud rate until you begin to see errors. Then drop back a notch. To change the baud rate in Modem7, use PFM or DDT to change the value of location 14F9. See Figure 1 for the hex values to put in that location. These values should be correct for the BB I, the Xerox 820, and the Kaypro II and 4.

■ ■ ■

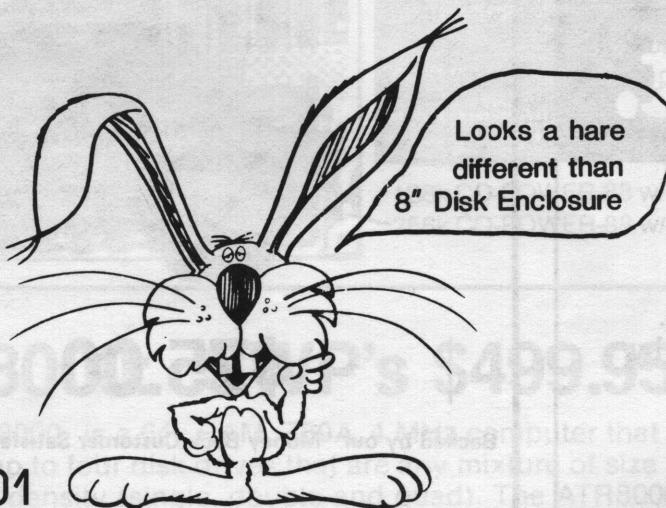
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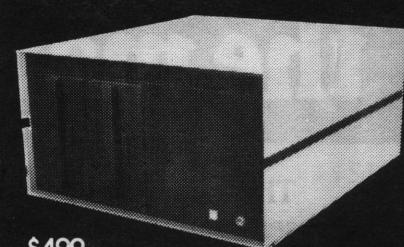
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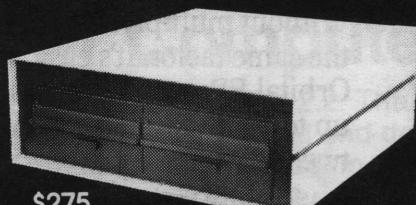
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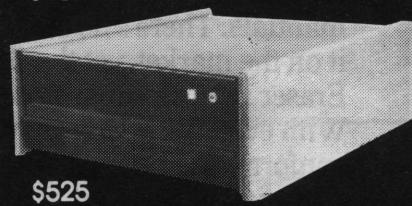
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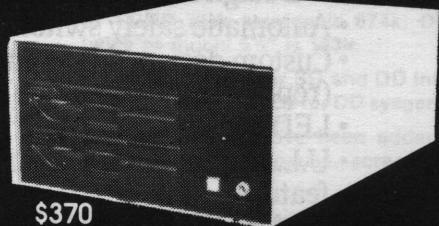
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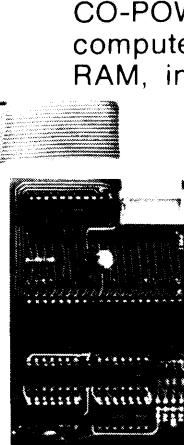
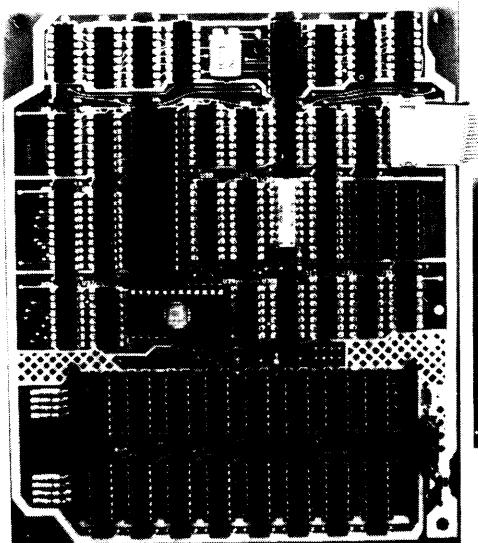
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We've just released a new version!

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Price: \$149.95

Software V#061983

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8" SS 4 MHz 8" DS 4 MHz
5 1/4" SS 2.5 MHz
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- Easy to change port parameters.

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Great Eight Kaypro

By Dana Cotant

One of the most common requests we have received is for an article that describes how to upgrade a Kaypro II to a Kaypro 4. The first portion of this article covers that modification.

Turning your system into a 4 doesn't do much, however, for those of you who already have 4's. So, the last part of this article covers turning your 4 into an 8. It doesn't matter whether you started with a II or a 4, once you have a 4 you can have an 8. (Then, of course, you might consider trading your new 8 for a 4 and two IIs so you can start over.)

Will the 4's Please Stand?

Note that even if your system is marked "Kaypro II," it may already be a 4 at heart. You may only need to change to double sided, 48 tpi Tandon TM 100-2s and get a copy of the 4 formatter in order to turn your system into a Kaypro 4.

Your Kaypro II has the heart of a 4 if it has a 2732 monitor ROM and the smaller ICs are soldered in rather than socketed. Look closely at U47 (it has paper stuck to the top) if it has 2716 printed on the ceramic you have a II board. If it has 2732 printed on the ceramic, then you probably have a 4 board.

Turning a II into a 4

First the Kaypro 2 board needs to be modified to use a 2732 for the monitor ROM. The extra code needed for drive side select will not fit into the nearly-full 2716 monitor ROM of the Kaypro 2.

To run a 2732 in a Kaypro 2 you first need to pick up an additional address line, A11. Pin 2 on U59 is address line A11.

You need to connect A11 to pin 21 on the 2716 socket. Pin 21 is normally tied to +5V. So, when you are ready to put a 2732 into the socket bend pin 21 out so that it doesn't go into the socket and then add a jumper between the bent out pin and U59 pin 2.

You have another option if you don't want to solder to the Monitor ROM (makes it easier to change ROMs later). Simply plug a second 24 pin dip socket on top of the original ROM socket. Bend out pin 21 on the new socket so that it doesn't go into the original socket. Now add the jumper to the socket's pin 21.

An additional select line from decoder

U60 must be used to select the second half of the 2732.

To use the select line, remove U60, bend out pin 15, and re-insert U60 into the socket, making sure that pin 15 does not make contact with the socket. Now let's gate in this additional signal.

There are a number of unused gates on the Kaypro (see the Micro C schematic for a list). Each of these gates has one or more of its inputs grounded. On U80, pin 5 is a grounded input. Remove U80, bend out pin 5, and re-insert U80. Now connect U80 pin 5 to U60 pin 15.

Of Pins and Pads

When you are working on the underside of the board, you count IC pins clockwise. Pin 1 is just right of the notch on the IC. A solder pad is the small circular piece of copper circuit trace to which socket pins are soldered. When we say pad, we mean the pad on the board. When we say pin we mean the pin on the IC itself. So, after pulling out U60 pin 15 we can jumper to U60 pin 15 (the pin on the IC) and also jumper to U60 pad 15 (the pad on the circuit board that the pin used to be connected to).

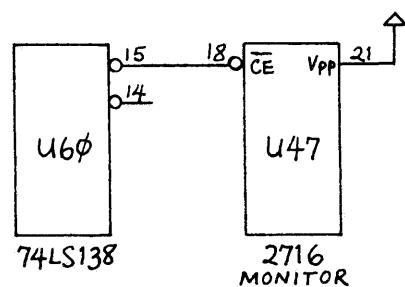
Working Under the Board

Jumper the following solder pads. Connect U80 pad 6 to U60 pad 15. This connects the output of U80 to the output enable (OE) input of the 2732. Also connect a jumper between U80 pad 4 and U60 pad 14. This brings the select for the upper 2K of ROM from the decoder U60 to a gate input in U80.

Floppy Drive Side Select

We have to find a spare inverter on the board and it turns out that U73, a 74LS04 hex inverter, has an unused gate. However, the inverter has to be fast, and have lots of output so we'll replace this 74LS04 with a 74S04. (They are identical except that the S part is faster and has more output than the LS part.)

Go ahead and remove U73. Before inserting the 74S04 in its place, bend out pin 5. Pin 5 is the grounded input of our unused inverter. Insert the 74S04 into socket U73 making sure pin 5 does not make contact with the socket. Connect this bent-out pin to the solder pad just right of the "E40" printed on top of the



Slicer Column

By David Thompson

It's not quite cricket for me to put just my name on this Slicer Column. You see, I've gotten so much great information from Earl Hinrichs, Dean Klein, Richard Harms, and Otto Baude that I'm tempted to add four more names to the author's line.

I haven't mentioned the others in previous issues for two very good reasons (as well as oversight).

First, Otto was the one who first called me about supporting the Slicer in Micro C and he has followed up by providing a lot of really good information.

Second, Otto came to the last SOG and brought Slicer tee shirts for my two little ones, Jennifer and Erin. They were men's size large which suited Erin just fine. She wears her bright purple Slicer shirt as a nightgown.

I understand that the whole crew will be coming to the next SOG. So, if you start hearing a lot more about Dean, Richard, and Earl after July 27, 1984, you'll know they showed up with oversize tee shirts.)

But, in the meantime, I can't ignore them totally; especially since they are doing some very interesting things. (Talk about product support, catch a load of the following.)

In early December I received a long handwritten note from Dean Klein (hardware designer of the Slicer). In the note he included details on the greatly anticipated expansion board. (The note was very legible until I started drooling on it, but here goes.)

Slicer Expansion Board

1. Same dimensions as the Slicer.
2. 256K Dynamic RAM (TMS4500 controller).
3. Two RS232 async ports (Signetics SC2681).
4. Two sync/async ports (Zilog 8530) capable of networking.
5. Battery backed-up real time clock (Motorola 6818).
6. One centronics printer port.

Dean says that you can add up to three of these boards to the Slicer, but the third board can only have 128K and cannot interrupt the processor.

They will be receiving the first prototypes on Jan 2 and plan to begin sales in

February or March. The expansion boards will be available in kit form as well as assembled and tested.

In kit form, the expansion board will be available as a bare board, bare board with RAM, and complete package. They haven't set the prices for the new board yet (depends a lot on the prices of ICs) but the kits should be approximately the same price as the equivalent Slicer package.

Dean expects the expansion board to help turn the Slicer into a very powerful multi-user system.

PC Bus Board

Dean is also working on a board which will accept IBM PC plug-in cards. It will simulate the 8088 type bus signals at the same speed as the PC.

A Direct Quote

"It will not be a full PC implementation because it will not support direct memory addressing (DMA). Since the PC uses DMA to handle refresh for dynamic RAM, this bus will not support add-on memory (you have to add memory via the expansion board)."

"This board, however, will let you use PC video and I/O boards and it will have connectors for a PC compatible or parallel ASCII keyboard. Thus you can use the Slicer without a terminal and have some degree of PC compatibility."

Dean began taping the PC board (what else you gunna' call it?) in mid December and expects to have it available in late Spring.

New Software

Meanwhile Earl Hinrichs hasn't been sitting on his keyboard. He's working on the PC emulation software. You will be able to run a program (in the CPM86 environment) which will set up the Slicer to read MSDOS disks and run MSDOS software. The Slicer won't, however, be running MSDOS. Pretty fancy, huh?

Also, Earl has been extending the CPM86 BIOS and the Slicer's monitor so that you can run a winchester. His set-up program lets you specify floppy step rates, disk sizes and types. Plus, you can tell the system to boot off any disk, including a winchester.

More from Otto

Even though Dean does the hardware and Earl writes the software, Otto gets to do more than deliver tee shirts. Most manufacturers forget that someone has to figure out which terminals and disk drives and power supplies work with their single-board whiz bang.

It looks like Otto has taken on this arduous task which saves you and me a lot of fumbling around. Plus, Otto has a real nose for bargains.

80186s

Plus, Otto has kept me posted on the difficulties he has had getting 80186s. It appears that Intel is still having problems with yield. They tell Otto that they are getting very few 6 MHz parts and almost none that will run 8 MHz. The Slicer folks have just received a new shipment of 150 parts, all 6 MHz.

Meanwhile Intel's 80186 product manager has been telling a reporter from Buyer's News that everything is hunky-dory and that Intel is producing tens-of-thousands of 186s.

It turns out that Radio Shack is planning to come out with a 186 based system shortly.

So the question is, are the 186s really buggy or is Intel suddenly shipping great quantities of prime parts to Radio Shack and using quality as an excuse for putting off everyone else?

I've been doing a little checking around and I've learned from a very solid source that Intel is really having problems producing 186s. (He is so solid that I can't tell you who he is, they might not let him past the guards again.)

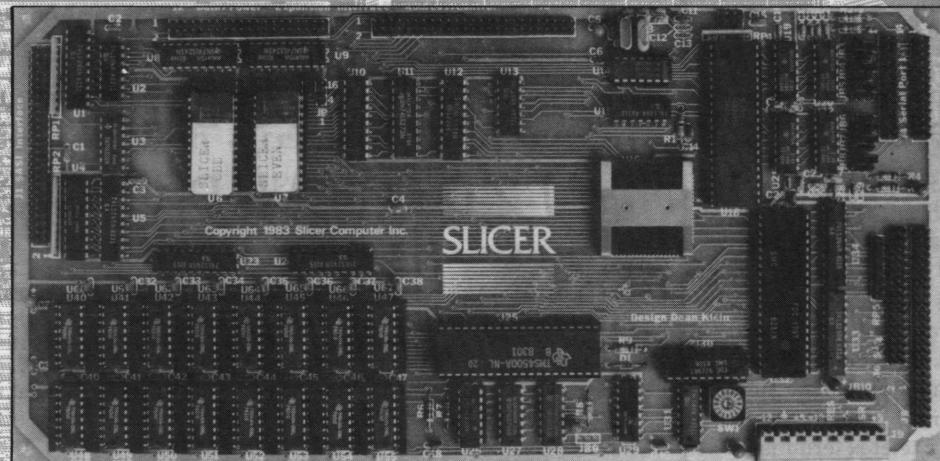
Meanwhile, Otto says that he has stopped counting how many Slicers they've shipped, (over 300 is a good guess) but they are limited now by Intel's production problems.

Cheap Terminals and other Notes

According to Otto, Jim Tanner's (Digital Research Computers of Texas) new terminal board works very well with the Slicer. The terminal has a reset problem which Otto thinks might be a problem with a 74LS04, but on the whole he thinks it is a tremendous value. You get

(continued on page 18)

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(see Byte magazine April '83)

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C'ing Clearly

By Tony Ozrelic

6708 Melrose
Los Angeles, CA 90038

Not too long ago I had a blinding flash of stupidity (as opposed to inspiration) and wound up destroying the directory of my documentation disk. The one with about 100k of typescript on it.

Needless to say, I did not look forward to re-typing the entire disk even though I knew what was on it! You see, I had not made any backups. Shame on me! I put the disk aside for a few days while I considered having a mental breakdown.

It soon occurred to me, however, that I might look at the undamaged portions of the disk and recover the text directly. The wheels in my head began to turn, and I put together two programs, RDISK and CDISK to help me undo the mess.

RDISK.C

This program is designed to display a disk a sector at a time. Basically, you give it a drive (a thru p) and the beginning track (0 thru 77) and it shows you the sectors which have text on them. Other sectors are skipped (see Figure 1).

RDISK also shows you the current track and sector. Hitting any key except "q" will take you to the next displayable sector. This way you can step thru the disk sector by sector, writing down the track and sector numbers of the text you need and then use CDISK to copy the text to a good disk. To use it, type:

rdisk b 3

To read the disk in drive B: starting with track 3.

CDISK.C

CDISK takes the track/sector numbers you have copied and reads them into a file on a good disk. See Figure 2. Use your text editor to generate a file with a track and a sector number on each line:

12 20
12 21
12 22
12 23
12 24

and so on. The first number is the track number, the second the sector.

While using RDISK, I noticed that CP/M uses a lot of consecutive sectors for text storage. To make typing easier, I put in a loop generator—if a line begins with

Figure 1 - Read Disk Routine in C

```
/*
  rdisk - read disk sectors from a damaged disk. Hitting any key
  will read the next sector on the disk, and hitting 'q' will
  quit the program. Use Manx Aztec C compiler on this program
*/
#include "libc.h"

/*
  maximum, minimum tracks, sectors
*/
#define MINTRK 0
#define MAXTRK 77
#define MINSEC 1
#define MAXSEC 26
#define YES 1
#define NO 0

/*
  macro definitions for the BIOS routines needed to read the disk
*/
#define home() bios(8,0,0)
#define select(n) bios(9,n,0)
#define seek(n) bios(10,n,0)
#define setsec(n) bios(11,n,0)
#define setdma(n) bios(12,n,0)
#define read() bios(13,0,0)
#define write() bios(14,0,0)

/*
  ivect is the index vector used to "straighten out" CP/M's sector
  mapping so tracks & sectors can be incremented by one
*/
int ivect[]={
  0,1,7,13,19,25,5,1,17,23,3,9,15,21,
  2,8,14,20,26,6,12,18,24,4,10,16,22
};

/*
  main program - type
  rdisk <drive> <trk>
  where <drive> is a letter a thru p for the drive on which the bad
  disk is mounted. <trk> is the first track you want to look at
*/
main(argc,argv)
int argc;
char *argv[];
{
  char buf[128];
  int disk,strk,trk,sec,i,tflag;

  if(argc>1) disk=argv[1]-'A'; /* get the drive number */
  else disk=0;
  if(disk<0 || disk>15) {
    printf("?\nBad disk drive %c -should be A thru P\n",argv[1]);
    exit(1);
  }
  if(argc>2) strk=atoi(argv[2]);
  else strk=MINTRK;
  printf("\n drive %d track %d selected\n",disk,strk);
```

(Listing continued next column)

```

for(trk=strk;trk<MAXTRK;trk++) {
    for(sec=MINSEC;sec<=MAXSEC;sec++) {
        select(disk);seek(trk);setdma(buf);
        setsec(ivect[sec]);
        read();
        tflag=YES;
        for(i=0;i<128;i++) {
            if(!istext(buf[i])) {
                tflag=NO;
                break;
            }
        }
        if(tflag) {
            printf(
                "\n\n>>> %d %d <<<<\n\n",
                trk,sec
            );
            for(i=0;i<128 && buf[i]!=0x1a;i++) {
                putchar(buf[i]);
            }
            if(getchar()=='q') exit(0);
        }
    }
}

/* istext - is it regular ascii text? */
istext(c)
char c;
{
    if(c=='\t' || c=='\n' || c=='\r' || c==0x1a) return c;
    else if(c>=' ' && c<='~') return c;
    else return 0;
}

```

Figure 2 - Copy Disk Routine in C

```

/*
cdisk - copy disk sectors as indicated by input file

This program is written to compile under Manx Aztec C and is
used to recover blocks of text from a damaged disk. This is
done by reading a file which indicates which blocks are to
be read in. These blocks are then written to a file on drive A:
*/

#include "libc.h"

/* minimum, maximum track and sector sizes */

#define MINTRK      0
#define MAXTRK      77
#define MINSEC      1
#define MAXSEC      26

/* CP/M buffer size, line size, etc. */

#define MAXBUF 128
#define MAXLINE 80
#define YES 1
#define NO 0

```

a dot, the next line is used as the end of a loop, so that the above sequence would be written as:

```

12 20
12 24

```

In many cases, you will find that reconstructing a file consists of just a few lines of typing. This file is given to CDISK along with the letter of the drive containing the bad disk and a filename on A: which will hold the copied sectors:

```
cdisk b sectors dyna.doc
```

Is what I used to recover DYNA.DOC from drive B: using the numbers in the file SECTORS. Recovering this file alone saved me about 29 Kbytes of typing!

A few Words of Warning

These programs work fine if you have Manx Aztec C and standard single-sided single density 8" disk drives.

Not all compilers can call BIOS routines directly, so consult your manual to see if this type of call is available. Also, I have noticed that not all compilers accept such sophisticated macros as #define select(n) bioshl(9,n,0), so you may need to make each of these macros a function call.

Another thing to watch out for is disk formatting. Your disk may be formatted to speed up data access so the sectors on the disk may not be numbered 1,2,3,.. but rather, offset by a constant, such as six.

This offset allows the controller to access the next sector more quickly since a slow controller might not be able to keep up with consecutively numbered sectors and would wait a full revolution before fetching the next one. All this means that ivect[] must be altered according to the way your sectors are mapped on the disk.

Also, I have found that on some minifloppies the sectors are numbered from zero, but 8" disks are numbered starting at one. Consult your friendly neighborhood BIOS listing or wizard to find out how your disk is formatted.

(Listing continued next page)

(C'ing Clearly continued next page)

Bells and Whistles

These programs are about as bare-bones as you can get. Some possible enhancements are:

Fix RDISK so you can move from sector to sector easily—perhaps n for next, p for previous, g for goto.

Make RDISK log tagged sectors in a text file for use by CDISK, or, better yet, transfer tagged sectors directly to a text file.

That's about it for now; study the listings and try to get them to work on your computer/compiler. If you improve on these programs, or discover your disk is formatted differently from what's here, send us your stuff so we can build up a better program for all.

C Users' Group Meetings

Somebody has finally taken the initiative and started a C Users' Group meeting here in LA. The meeting will be held the second Tuesday of every month at Shakey's Pizza, 5321 Laurel Canyon, North Hollywood. The meeting starts at 7 PM and lasts until 9 PM, or whenever.

■ ■ ■

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```
/*
   these are definitions for each of the CP/M bios operations needed to
   access the disk.
*/
#define  home()      bios(8,0,0)
#define  select(n)   biosl(9,n,0)
#define  seek(n)     bios(10,n,0)
#define  setsec(n)   bios(11,n,0)
#define  setdma(n)   bios(12,n,0)
#define  read()      bios(13,0,0)
#define  write()     bios(14,0,0)

/*
   ivec is the index vector used to map the linear address (1,2,3...26)
   into CP/M's sector address (1,7,13,...22). This index varies from
   system to system depending on how your disk sectors are mapped. You
   may need to change this map if you use the program on double density
   or minifloppy drives
*/

int ivec[]={
  0,1,7,13,19,25,5,1,17,23,3,9,15,21,
  2,8,14,20,26,6,12,18,24,4,10,16,22
};

/*
   main program - type
   cdisk <drive> <numfile> <datfile>
   where <drive> is ranges from a thru p. The bad disk is on this drive.
   <numfile> is the text file of track and sector numbers needed to
   be recovered. <datfile> is the file in which the text will be stored.
*/

main(argc,argv)
int argc;
char *argv[];
{
  char buf[MAXBUF],s[MAXLINE]; /*buf is gonna be CP/M's disk buffer*/
  int disk,trk,sec,i,endtrk,endsec;
  FILE *fnum,*fdat;

  if(argc<4) {
    puts("#\nUsage:\nncdisk driveno numfile copyfile\n");
    exit(1);
  }
  disk=&argv[1]-'A'; /*get the drive we're gonna read */
  if(disk<0 || disk>15) {
    printf("\nBad disk drive %c\nShould be A thru P\n",*argv[1]);
    exit(1);
  }
  /*
   fnum is the file with the track/sector numbers we need to read
   fdat is the text file we're putting the text into
  */
  if((fnum=fopen(argv[2],"r"))==NULL) cantopen(argv[2]);
  if((fdat=fopen(argv[3],"w"))==NULL) cantopen(argv[3]);

  /*
   until we run out of numbers, let's read in blocks from the disk
  */
  while(fgets(s,MAXLINE,fnum)!=NULL) {
    if(*s=='.') { /*if a dot, get next number*/
      fgets(s,MAXLINE,fnum);
      getnum(s,&endtrk,&endsec);
    }
    else {
      getnum(s,&trk,&sec);
      endtrk=trk;endsec=sec;
    }
    while(1) {
      printf("\n\n>>>> trk %d sec %d <<<<\n\n",trk,sec);

      select(disk); /*now read disk*/
      setdma(buf);
      seek(trk);
      setsec(ivec[sec]);
      read();
      puts(buf);
      select(0); /*go back to A: to write out sector*/
      fputc(buf,fdat);
    }
  }
}
```

```

        if(trk==endtrk && sec==endsec) break;
    else {
        sec++;
        if(sec>MAXSEC) {
            sec=1;
            trk++;
        }
        if(trk>MAXTRK-1) trk=0;
    }
}
fclose(fnum);
fclose(fdat);
exit(0);
}

/* cantopen - squawk about file opening */

cantopen(s)
char *s;
{
    printf("Can't Open: %s\n",s);
    exit(1);
}

/* getnum - get 2 nos from line */

getnum(s,n1,n2)
char *s;
int *n1,*n2;
{
    *n1=atoi(s);
    while(isdigit(*s)) s++;
    *n2=atoi(s+1);
}

```

END

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FORTHwords

Column by Arne A. Henden

7415 Leahy Road
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I just got back from a most enjoyable FORTH convention and thought you might like to hear about what I saw. In addition, this column will give you the latest benchmarks on the new processors, and the User's Corner will discuss printer graphics.

16-bit Microprocessors

The October 13, 1983 issue of EDN magazine (p. 193) has one of the more interesting comparisons of the currently available 8 and 16 bit processors. Instead of using benchmark speeds, Kuare Christian compares processor architecture (number of registers, stacks, addressing modes, etc.). I feel this is a much more valid comparison than benchmark times.

However, I presented simple benchmarks in Micro Cornucopia in issue #5 (April 1982), comparing FORTH implementations on various processors. Since then, UNIFORTH has been ported to several new 16-bit processors. Figure 1 lists these new implementations, along with a Z80 base version for comparison. The general operations tested are listed beside the test name; the full coding of the test can be found in issue #5. The times listed are in microseconds for one execution of the loop.

I'm impressed with the 8088/8087 pair. While a considerable amount of coding is required to fully implement the 8087's transcendental functions, the speed advantage is remarkable. UNIFORTH uses the data stack for storing both integer and floating point numbers. If you use the 8087's stack for the floating point storage, tests T6-T16 would be 10-30% faster.

The PDP-11 tests indicate the speed advantage between various models. T3A is slow because the PDP-11 instruction set does not include unsigned multiply/divide, so these functions must be emulated. The new LSI-11/73 card from DEC using the J-11 chip will benchmark right at the 11/44 times. For \$2000, this card will be an easy way to upgrade your LSI-11.

The 68000 times indicate that FORTH on the 68K is within a factor of two of FORTH on a PDP-11/44. However, the listed 68K times are for a 16-bit implementation. A full 32-bit version is about

the same speed on the 68K, but would be much slower (if even possible) on the 11/44. A 4MHz 68000 is not all that different in speed from a 4MHz Z80. The advantages of upgrading to a 68K are the larger address space, numeric coprocessor support, and the faster clock speeds.

The 16032 timings are not really indicative of the ability of this processor. The benchmarks were run on a DB16000 development board which has wait-stated memory, so any operation that requires memory access (such as T4) is significantly slower than would be the case in an actual system. I anticipate the true times would be almost as good for the 16032 as for the 68000. The 16032 is the only processor in this group that provides 32-bit integer multiply and divide, making a true 32-bit FORTH possible.

The FIG National Convention

I attended the National Convention (held in Palo Alto, CA, October 14 and 15) for the first time as an exhibitor. Unfortunately, duties at the booth prevented me from taking in all of the sights, so my report is going to be one-sided. If someone else who attended the meeting wants to report on the sessions, please drop me a line.

For a very specialized field, the turnout was impressive. Figures quoted to me were about 600 people on Friday and 800 on Saturday, making this year's convention turnout double last year's fig-

ures. I found the experience mix interesting: about half of the people passing the booth had extensive FORTH knowledge (usually having implemented their own version of FORTH), and the other half were interested but had never used FORTH before. A large number had Commodore 64's and wanted a faster language than BASIC.

Laboratory Microsystems had a large display, showing off color graphic world maps and real-time graphics on an IBM-PC. Mountain View Press was the cornerstone of the exhibit area, with some 50 feet of counter space. They were displaying their latest publications and MVP-FORTH versions.

New Micros Inc demonstrated the Rockwell R65F11 FORTH chip development system. This is a 2.5-inch square board with the FORTH chip, an RS232 port, 2 parallel ports and up to 24K EPROM/RAM, all for \$250!

Hartronix demonstrated a single board FORTH engine based on a micro-programmed bit-sliced processor. The board included a clock, up to 32K RAM, two RS-232 ports, a double density floppy controller and much more, for a \$995 base price.

These two single-board FORTH products might make excellent controller boards.

Other products included a multiuser FORTH from Shaw Labs (CP/M, Micropolis and North Star), tFORTH/68K

Figure 1 - FORTH Benchmarks

TEST	Z80 4MHz	8088 5MHz	8088 5MHz	11/2 FIS	11/23 3MHz	11/44 10MHz	68K 8MHz	16K 7MHz
T1 (loop)	55	35	35	38	19	8	14	24
T2 (I, +, -)	131	82	82	78	42	17	31	56
T3 (I, *, /)	739	141	141	250	128	86	58	77
T3A (I, U*, U/MOD)	697	169	169	1237	571	282	66	105
T4 (θ, !)	113	73	73	90	48	22	33	61
T5 (Cθ, C!)	108	73	73	99	52	23	35	67
T6 (D+)	108	68	68	91	49	21	24	45
T7 (FLOAT, FIX)	420	632	70	990	109	40		
T8 (F*)	690	950	152	200	136	47		
T9 (F/)	1780	2740	173	320	182	48		
T10 (F+)	460	550	146	180	127	40		
T11 (2dup loop)	118	79	79	88	47	20	29	52
T12 (FSQRT)	10500	14000	140	2290	1110	480		
T13 (FLOG10)	35800	46700	340		4230	1360		
T14 (FEXP)	26000	33900	350		3560	1080		
T15 (FATAN)	38200	51200	400		5010	1440		
T16 (FSIN)	27300	36900	510		3010	910		
T18 (CMOVE)	1170	846	846	4064	2200	918	616	686
Sieve	84	53	53	64	37	15	21	

from Talbot Microsystems, and Telos X (from the inventors of Valdocs on the QX-10).

For those of you interested in implementing FORTH-83 on your computer, No Visible Support Software, P.O. Box 1344, Berkeley, CA 94704 is supplying FIG-like disk versions for the 8080 CP/M, 8086 CP/M, and 8086 MSDOS for \$25 a copy, an unbeatable bargain. These versions were implemented by Henry Laxen and Mike Perry, both good fellows to know.

The Institute for Applied Forth Research Inc. publishes the Rochester FORTH Conference proceedings. One of their latest publications is *A Bibliography of FORTH References* which lists all magazine/book articles up to 1983 by author and subject. For \$15, it's one book that we all should own. You can order it from them at 70 Elmwood Avenue, Rochester, NY 14611 or from Mountain View Press. I picked up my copy at the meeting, and it made the long flight home much more enjoyable.

Forth User's Corner

One of the advantages to buying a dot-matrix printer is the capability of performing dot-addressable graphics. The Epson MX-80 equipped with the Graftrax PROMs is one of the cheapest graphics hardcopy devices available.

Epson Graphics

The MX-80 has two graphics modes: low resolution, 60 dots per inch (480 dots/line), and high resolution, 120 dots/inch (960 dots/line). The vertical spacing

is always 72 dots/inch. The high-res mode overlaps dots and makes much nicer-appearing lines. For that reason, we recommend that you use the high-res mode if possible.

Before using the MX-80 in graphics mode, you need to set the line spacing. The line spacing in graphics mode is equal to $n/72$, where n is the number of pins in the printhead that you are going to be using.

For example, if you can send 8-bit data to the MX-80, n should be 8; if you are using 7-bit serial communication, n will be 7; if you just want to print one line at a time using 1 pin, set n to 1. The word NDOTS, shown in Figure 2, will send the proper sequence to the printer.

When in graphics mode, 8 lines of dots are printed in one pass of the printhead. When you send a byte of data to the printer, the most significant bit controls the topmost pin, and the least significant bit fires the 'bottom' pin (actually, one up from the bottom, since there are 9 pins and only 8 can be used). If you send the printer 'FF' (hex), all 8 pins will be fired; a '01' will just fire the bottommost pin.

To put the Epson in graphics mode, you need to send the sequence:

```
ESC K n1 n2
27 72 xx xx
```

where $n1$ and $n2$ are combined by the printer to determine the number of horizontal dots to be printed on the current printhead pass. The algorithm is:

$$m = n1 + 256 * n2$$

Figure 2 - Screen of Epson Printer Commands

```
SCR # 10
0 ( SIMPLE EPSON PRINTER PLOTTING )
1 : NDOTS ( n --- set line spacing to n/72)
2 27 PREMIT 65 PREMIT PREMIT ;
3 : TRAN ( m --- put Epson in graphics mode for m bytes)
4 960 MIN 256 /MOD SWAP 27 PREMIT 76 PREMIT PREMIT PREMIT ;
5 : BAR ( n --- draw 2-dot horiz line n columns wide)
6 192 SWAP 960 MIN 0 DO DUP PREMIT LOOP DROP ;
7 : PCR ( send carriage return to the printer)
8 13 PREMIT 10 PREMIT ;
9 : HLINE ( n --- draw horizontal line)
10 8 NDOTS DUP TRAN BAR PCR 12 NDOTS ;
11
12 ( for the uninformed, PREMIT works just like EMIT)
13 ( except outputs to the printer only)
14
15 ;S
```

(that is, m is a 16-bit integer with its upper and lower bytes separated and sent to the printer as 'characters'). You can specify up to 2047 dots per line, though the MX-80 is limited to 960, so be careful. The word TRAN uses the 16-bit number on top of the stack and tells the Epson to print that number of dot columns.

After this sequence, you enter the actual byte-wide bit patterns for the printhead. When m bytes have been sent to the printer, it will revert back to character mode.

As a simple example of plotting, look at the word BAR. It sends a user-specified number of 192's to the printer. In hex, 192=C0, which means that the upper two pins in the printhead will be fired. BAR will then create a horizontal line 2 dots high and a user-specified number of dots long, when used in conjunction with TRANS to initially set the printer in graphics mode. The word HLINE performs the entire function: sets the line spacing to 8/72 inches, puts the MX-80 in graphics mode, outputs the line, carriage returns, and then resets the line spacing to the default 12/72.

Beyond this, you're on your own. The simplest method of plotting would be to use a single pin and plot one horizontal line at a time. The method used in the UNIFORTH plotting package is to print 8 lines at once by filling a 960-byte buffer with zeroes, calculating each of the 8 lines by OR'ing in the appropriate bits, and then shipping the buffer to the printer. This method is much faster and less wearing on the printhead, but involves a lot more software. Read the graphics chapters in your printer manual for more information.

Next issue

We will cover one of the topics dearest to my heart: error handling. Any user contributions will be incorporated into the column with deepest appreciation. Enjoy your spring!





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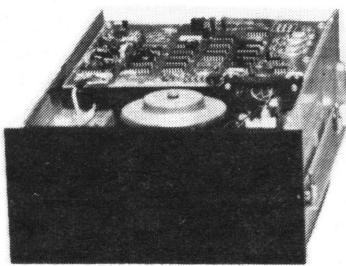
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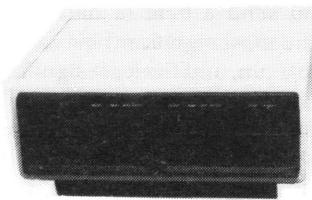


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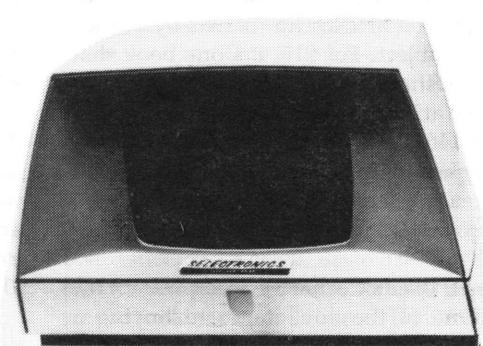
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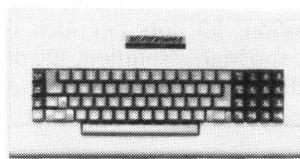
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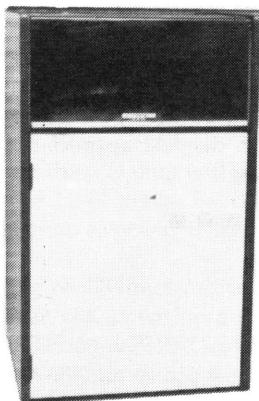
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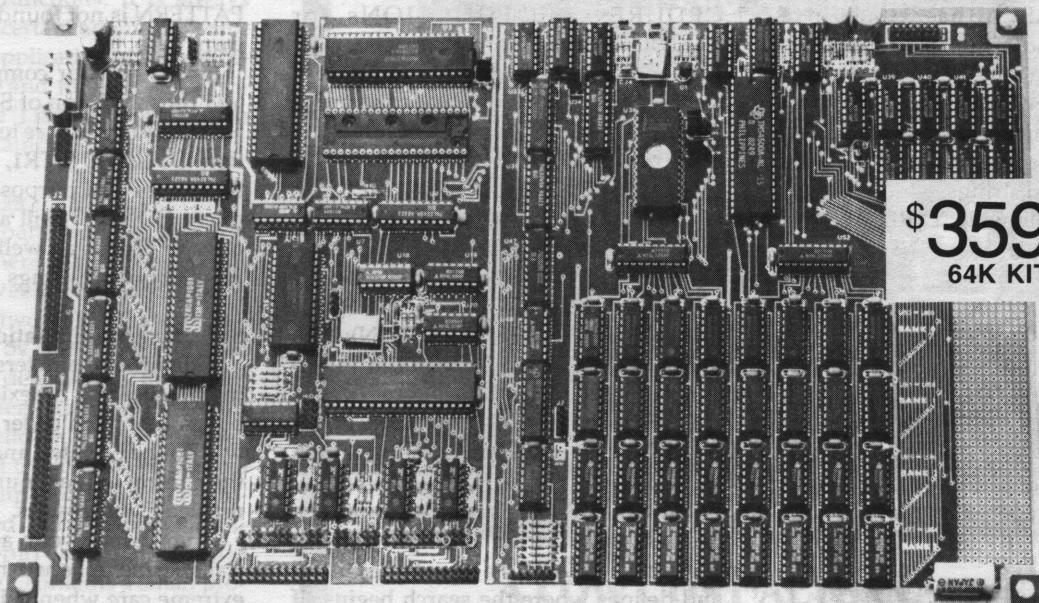
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Pascal Procedures

By John P. Jones

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Standard PASCAL has no built-in facilities for handling character strings. Arrays of characters can, however, be used as fixed-length strings. The strong data typing built into standard PASCAL limits the kinds of manipulations that are allowed for fixed strings.

Given the following TYPE and VAR declarations:

```
TYPE
  fixed_short = ARRAY [1..20] OF CHAR;
  fixed_long = ARRAY [1..128] OF CHAR;
VAR
  fs1,fs2,fs3 : fixed_short;
  fl1,fl2,fl3 : fixed_long;
```

Only variables of the same type may be assigned or compared so that the statement,

```
fs1 := fs2;
```

is correct, but the statement,

```
fl2 := fs3;
```

would generate an error. Similar constraints apply to comparisons of character arrays.

In order to manipulate fixed strings, a series of procedures and functions have to be written to handle the arrays at the character level. The alternative is to declare all fixed strings to be the same length.

The String

Fortunately, all the popular PASCAL compilers have extensions to handle a non-standard type called STRING. A STRING is a dynamic (variable length) character array. As mentioned in an earlier column, there is an implied TYPE declaration for STRING of:

```
TYPE STRING = RECORD
  current_length : 1..max;
  char_array : ARRAY [1..max] OF CHAR;
END;
```

If the maximum length for the STRING variable is not specified in its declaration the compiler assumes a default length, usually 80 characters.

String Procedures and Functions

Compilers which provide the type STRING will also include several PRO-

CEDUREs and FUNCTIONs for STRING manipulation.

COPY (SOURCE, START, LENGTH); is used to extract a copy of a substring of LENGTH from SOURCE beginning at array position START.

Using the same syntax, DELETE (SOURCE, START, LENGTH); will remove the substring from SOURCE, updating the current length in the process.

The reverse procedure INSERT (SOURCE, TARGET, POSITION); will insert SOURCE into TARGET at POSITION.

The function LENGTH (SOURCE); returns the current (not maximum) length of SOURCE, and POS (PATTERN, SOURCE, START); is used to locate the position of substring PATTERN within SOURCE. START is usually optional and defines where the search begins. If

PATTERN is not found, the function returns zero.

Finally, if your compiler does not allow concatenation of STRINGS with the '+' operator it is sure to include the function CONCAT (STR1, STR2, STR3, ... STRn); for that purpose. For some compilers CONCAT will accept parameters of type CHAR as well as dynamic and literal (quoted) strings.

Substring Manipulations

Individual characters in a string can be manipulated by indexing into the array, but caution is in order. Dynamic length will not be updated and indexes beyond the current or maximum length will give unpredictable results.

If you want your applications to be transportable between compilers, use extreme care when using STRINGS and

Figure 1 - Error Checking in Pascal String Routine

```
CONST  namesize = 20;
TYPE   name = STRING [20];
VAR    last, first, entire : name;
.
.
.
IF ( LENGTH (last) + LENGTH (first) ) <= (namesize - 1)
  THEN entire := CONCAT ( first, ' ', last)
  ELSE entire :=
        CONCAT ( COPY (first, 1, namesize -1 -LENGTH(last)),
                  ' ', last);
```

Figure 2 - Pascal String Compare Routine

```
PROGRAM string_compare (INPUT, OUTPUT);
VAR
  str1,str2 : STRING;

BEGIN
  REPEAT
    WRITE ('String 1 : ');
    READLN (str1);
    WRITELN;
    WRITE ('String 2 : ');
    READLN (str2);
    WRITELN;
    WRITE ('<', str1, '> is ');
    IF str1 = str2
      THEN WRITE ('equal to')
      ELSE IF str1 < str2
            THEN WRITE ('less than')
            ELSE WRITE ('greater than');
    WRITELN ('<', str2, '>.');
  UNTIL str1 = 'END';
END.
```


The Kaypro Column

By David Thompson

Kaypro has suddenly become IBM "compatible" with its inclusion of the Co-Power 88 board on special versions of the Kaypro II and 4. The Co-Power board raises the price of the Kaypro by about \$400.

How easy is the Co-Power Mod?

This is an easy mod. A small interface board plugs into your Z80 socket, your original Z80 simply plugs onto the adapter board. Now a cable from the adapter board gives the 8088 on the Co-Power board access to all the Kaypro I/O. So it uses the drives, the power, the video, the serial and parallel ports from the original Kaypro. Otherwise it lives pretty much on its own. It can act as a RAM disk for the Z80, however.

IBM Compatibility

IBM compatibility is the magic word, however. Yes, this board runs MSDOS just like the IBM, however, there are some I/O differences, especially in the display. You see, the IBM is capable of graphics and as yet, there is no way for the Kaypro to display graphics the same way.

The MicroSphere color graphics board supports CP/M standard graphics (which is considerably more powerful than either IBM or Apple graphics) but is not compatible with either IBM or Apple.

Is IBM Exciting?

People sometimes lose sight of the fact that IBM did not design the PC to be particularly powerful or a particularly good value. IBM designed around hardware that was mature when they started the design. In fact, in many cases the 4 MHz Z80 runs the same instructions faster than the 4.77 MHz 8088.

Sure, the 8088 can address more memory than the Z80, but the memory is addressed in 64K chunks (similar to bank switching on the Z80). Also, programs that were written in assembly language on the Z80 to maximize speed and minimize program size are often being written in high level languages for the IBM because there is so much more memory. These programs run slower than their assembly language counterparts. So, the

trend has been toward larger, slower programs.

784K per drive

Would you believe 784K per drive on a Kaypro II or 4? Well, believe it. See the article in this issue on doing your own upgrades for these systems. 784K on a 5" drive is really incredible, especially when you figure that we are using whole bits (half-bits are still in the experimental stage and two-bit technology is, of course, dead). And, of course this new Pro-8 is compatible with the II and the 4.

Interference and the Older Kaypro

Some rural readers have noted that they can't run their Kaypros and their TVs at the same time. So, in recognition of marital bliss week—and to avoid putting old Kaypros out to pasture prematurely—I have a few suggestions.

AC Cord

The oldest (and noisiest) Kaypros have an AC cord that is permanently connected the back panel (not a plug and socket). These units don't have an AC line filter (the AC wires go directly to the on/off switch).

If you have one of these units, the first thing you need to do is purchase an AC line filter. You can get one that mounts on the inside of the cabinet, then you connect very short leads from the power cord to the filter. Or, even better, you can purchase a new cord and filter combination (the filter has a power socket built in).

Cabinet Lid

Now, check the inside edge of your cabinet lid. There should be rectangles of shiny bare aluminum which match up with shiny bare rectangles on the main cabinet (they line up with the screw holes). These rectangles provide electrical contact between the cover and the main cabinet. If you don't have the rectangles, get a good file and make some shiny spots around the screw holes.

These two modifications should cure most of the problem. (You remembered to replace the lid, right?) If you are still having problems then you need to check out the radiation from the keyboard and printer cables.

Take an AM/FM pocket radio and place it near the Kaypro. Tune around on both bands noting any strong signals (might be raspy). Any signals generated by the Kaypro will disappear when you turn the power off.

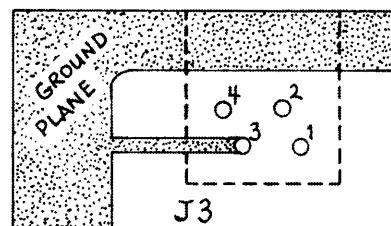
Move the radio around the Kaypro and see where the signals are the loudest. If your cover is doing its job, the cabinet will be quiet and the signals will be loudest around the keyboard, the keyboard cable, and the printer or modem cable.

You can purchase shielded RS232 and parallel interface cables (or just get shielded multiconductor wire and add your own shielded connectors). Or you can keep the serial and parallel cables disconnected during prime time.

Keyboard

The keyboard is another matter. It's hard to do much with the Kaypro when the keyboard is unplugged and I haven't heard of any shielded phone cables that you could use for the keyboard.

However, you can try bypassing the keyboard interface. Solder a .01 disc ceramic capacitor (25V or higher rating) between ground and pins 1, 2, and 4 on J3. J3 pin 3 is grounded and you can see the ground plane running to it on top of the circuit board. (Look for J3 stenciled on the top of the circuit board, right above where the keyboard plugs in.) The pin diagram and numbers are stenciled right behind the pins themselves.



Gently scrape the green solder mask from the ground plane (large copper area) so you'll have a space to solder the capacitor leads. Keep the capacitor leads very short.

When you get done with all this, you should have the quietest Kaypro on the block. If that isn't quiet enough then to heck with marital bliss.

Lubricating drives

Drive manufacturers have universally insisted that you shouldn't lubricate their drives. I bought that line until one day my trusty (though noisy) Shugart 8" boat anchor locked up solid. I was desperate and I had nothing to lose, the drive was no good to me the way it was.

So I rummaged through the garage looking for something that might be slick or slippery. The choice was axel grease, gear lube, 3-in-1 oil, 30-weight Valvoline, Liquid Wrench, or WD-40. I chose WD-40 (after all, it worked on hood latches) and very lightly moistened a q-tip.

I used the q-tip to lubricate everything that wiggled, slid, squeaked, twisted, or groaned. I didn't use much, you understand. In fact I used so little that it took a while for things to free up. But they did free up very nicely and for the last year and a half, has been the quietest drive in the house.

Some kind person called me and suggested that I try lubricating my 5" Tandons (makes them silent he said). Well, I wrote his name down and immediately lost the slip—probably because he was so quiet. Anyway, until he calls again, he will also be anonymous.

He recommended that I use either Tri-Flon or Tri-Flow—available in any sporting goods or lock store. However, WD-40 had worked before (and I've since learned that Xerox computer repair centers use it) so I got out my trusty can, soaked a new q-tip, and went to work.

Removing the Drives

First, you need to remove the drives from the cabinet. If you have the stacked horizontal drives (newer Kaypro) you need to take out the PC board and then remove the 8 allen screws along the sides of the drive housing (on the older units, remove the 8 standard screws, 4 on top and 4 underneath). Then the drives pull out the front of the cabinet. Remove the the power and control cables as you pull the drives forward.

Mark drive A with a piece of masking tape if you're not sure you're going to be able to tell A from B after they're out.

Opening up a Drive

Remove the circuit board from the drive by disconnecting plug 6 (as well as plug 5 if the drive is double-sided), remove the two screws holding down the board. Then slide the board back slightly and pull it up and away from the drive. Now you can see the head assembly.

Greasing the Skids

Lightly lubricate the steel rods the head rides on. Then move the head assembly back and forth gently to spread the lubricant. Be very careful how you handle the head carriage, don't stress it. The head assembly will always have some drag because of the permanent field in the stepper motor, so don't expect it to slide lightly from end to end.

Before you turn the drive over, lubricate the door latch rod and take a close look at the head(s). Shine a strong light on them and look closely at the light's reflection off the surface of the head.

If the heads are clean and shiny (no marks) then leave them alone. If they have dull spots or lines, then saturate a clean q-tip in rubbing alcohol and gently swab them. Let them dry a minute or two and see if they are clean. If not, repeat the swabbing.

If there are marks that don't come off, then you need a new head (usually cheaper to get a new drive). Don't use a standard head cleaning disk, they are very abrasive! (Sure, the salesmen like to sell head cleaning disks but the folks I know who repair drives refuse to use them. In fact, they refuse to even swab the heads unless they need it.) Sure, inspect the heads every few months, but don't destroy them.

Now turn the drive over. Gently remove the drive belt and use a phillips-head screwdriver to remove the screw from the large drive wheel (the one with all the little timing spokes). Pull the wheel free (rock it gently).

Here, I used the little tube on the WD-40 can to inject (dribble) a tiny amount of lubricant into the exposed bearing. (Not all over it, just a touch, then rotate the bearing so you can feel it get freer.) Replace the wheel (you'll probably have to hold the shaft on the disk side to tighten the screw again).

Also dribble a tiny amount of lubricant onto the drive motor bearing (under the small pulley) and onto the stepper motor bearing (through the little hole in the plastic). Don't expect either motor to spin freely, steppers are supposed to be rachety feeling.

Back Together

Reinstall the drive belt, the circuit board, and the plug(s) for the head(s). Note that a plug's number should be up so you can see it and should correspond with the number printed on the circuit board. Now put the drives back into the cabinet.

CAUTION: Most folks think that if a little lubricant is good, then more lubricant is better. Not here. More lubricant just runs all over, ruining disks and collecting dirt (then system bugs start tracking gooey, oily dirt all over). Use only enough lubricant to free things up.

Slow RAM

I have a report that some Kaypros are not making 5 MHz because of slow RAM. Don Williams called to say that about 10 percent of the systems they modified wouldn't run 5 MHz until they changed the eight 64K RAM chips (U20-27). That's surprising because the older Kaypros that I've seen have been 200 ns (usually a -2 after the part number).

Locating a Slow Part

Heat is a real problem in the Kaypro II and 4 if you have one or more parts that are marginal. As ICs warm up they slow down, so marginal parts finally give up.

Once your system is really out to lunch (it won't respond to anything but a greasy hamburger or a reset) then slip off the lid and start cooling the parts one at a time (leave the system powered up). Start cooling the 40 pin ICs first, then the smaller ones like the ROMs and RAMs.

Two Ways to Cool It

There are two ways to cool a part. You can purchase a can of freeze spray (it comes under various brand names) and then spray a part until it is covered with frost and try doing whatever didn't work. Unfortunately these cans contain fluorocarbons. Fluorocarbons are not good for the ionosphere (or you either).

You can put an ice cube in a plastic bag and then hold the bag firmly against the IC. This method isn't as fast as the freeze spray but I've found it just as effective. You need to hold the cube against the IC for about 60 seconds to be sure the circuit inside the chip has cooled down. Then try the system.

Perfect Help

Perfect Software has moved its technical help department from Eugene, Oregon to 702 Harrison St, Berkeley, Ca, 94701. Their number is 415-524-1926 (7 a.m. to 6 p.m. Pacific Time).



SBASIC

Column by John S. Steinhauser

2512 S. University Apt. 307
Denver, Colorado 80210

Kaypro owners, you have a diamond in your rug. I'm talking about SBASIC, part of the software package that is included with most Kaypros. SBASIC may not be as easy to use as an interpreter like Microsoft Basic (also included with Kaypros since March 1983) but it more than makes up for this difficulty.

Features

SBASIC is a true native code compiler that not only uses many BASIC commands but also includes many features found only in the newer structured languages.

1. It has six data types: single and double precision floating point, integers, fixed decimal (financial), characters and strings.

2. All variables are local to the procedure in which they are defined unless they are specifically defined as globals.

3. Global variables (variables which can be accessed throughout a program—standard for most BASICs) can be global to a single program or available to chained programs. (A program is chained when it is called and run from another program.) Variables can even be positioned dynamically.

4. You have logical blocks using BEGIN and END statements. You can use a block anywhere you could use a single statement. (You Pascal buffs with us so far?)

5. You can choose from all the standard structure statements such as PROCEDURE, FUNCTION, BEGIN & END, IF THEN ELSE, WHILE, REPEAT, CASE, and, of course, local variables.

6. You can develop your own library of PROCEDURES, and access them through \$INCLUDE statements in the source. This cuts development time substantially.

7. Functions and procedures are recursive, that is they can call themselves.

8. The I/O statements, INPUT and PRINT give you lots of formatting flexibility.

9. SBASIC can generate and access random and serial files in either ASCII or binary form. Binary files use less disk space than ASCII. File I/O is one of the most versatile available.

10. The compiler has a trace feature as well as compile-time and run-time error statements. The compile-time and run-time statements indicate the type of error found and its location.

11. It also supports statements like TEXT and COMMENT so you dispense with repeated PRINT or REM statements. Menus and program documentation become a breeze.

History

The compiler is the brainchild of Gilbert Ohnysty (sounds like honesty). Gilbert began his involvement with microcomputers in the early seventies "before anyone knew what they were." Frustrated by inadequate tools available for micros, he resolved in early 1979 to develop a very advanced BASIC.

Ohnysty had two goals. First, he wanted to create a language that would be easy for BASIC hackers to move up to. Second, he wanted to meet the needs of experienced commercial programmers who wanted a powerful structured language they could use in the micro environment.

The compiler took two years to develop and though it was an enormous task, it was pretty much a one man effort. Every algorithm, every piece of code, was conceived and written from scratch.

In 1982, Topaz, Gilbert's company, was purchased lock, stock, and compiler by Kaypro, and Gilbert wound up as Kaypro's chief of software engineering. It's not too surprising that all Kaypros (except, unfortunately, the latest Kaypro IIIs) have been shipped with SBASIC and it's not too surprising that much of the custom software included with the Kaypro is written in this neat language.

An interesting footnote is that some of the material that Kaypro computer owners receive as SBASIC documentation was really part of the original technical specifications for SBASIC, written before the program development began.

Documentation

SBASIC's major problem is its manu-

al. When I complained about the documentation to the technical support staff at Kaypro, I was told that the documentation was perfectly adequate for an experienced programmer. Well, it is, and it isn't. But either way, what about those of us who are trying SBASIC as a first language?

I later described my frustrations to Ohnysty and he replied that the SBASIC manual was not intended as a tutorial but rather as a compact reference source.

"It is no place to learn concepts," he noted, suggesting that I purchase books on advanced programming concepts at my favorite bookstore.

After much trial and error, I have succeeded in figuring out large portions of the language. Still, I feel that some bright person could do us all a favor by putting together the right kind of documentation for SBASIC. It would be accurate, friendly, and easy to use.

For those of you who can't wait for the book, I suggest you read the first part of the SBASIC manual and start trying things. Examples of SBASIC programs can be found by TYPEing out the three programs included on the Kaypro CP/M disk, XAMN.BAS, DPLAY.BAS, and FAC.BAS. But be careful out there, don't try to byte off too much at once!

Editor's note:

I have been digging around here to see if I have any texts to recommend to those of you who would like to learn programming in SBASIC the right way.

BASIC with Style is a very good little book for learning style when you are limited to a classic BASIC. But SBASIC is so far beyond the classic Dartmouth or even MicroSoft BASIC in its structurability that the examples in this little book are worthless. Still, it has some very good ideas about how you can go about conceiving, diagramming, and finally coding really good programs. Plus, it is easily to follow. A good beginner's book. BASIC with Style is published by Hayden Book Company, ISBN 0-8104-5115-8, about \$7.00.

Software Tools by Kernighan and Plauger is an excellent book. There are two versions of this. One has the program examples in RATFOR (RATional FORtran) a language whose structure and syntax closely resembles C. It should be quite easy to take many of the RATFOR examples and rewrite them in SBASIC. The other version of this book has the examples in Pascal, which also has program structures similar to SBASIC, so you could pick up either version.

(continued on page 34)

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Official Newsletter of the KAYPRO USERS' GROUP

SPECIAL EDITION

AN INVITATION TO JOIN KUG

KUG, The International Kaypro Users' Group, cordially invites you to join the many thousands of members who share in mutual Kaypro computer excitement.

The Kaypro Users' Group was established at the same time the Kaypro computer was being introduced. That was back in the autumn of 1982. Since then we have both grown and matured. **KUG** now has members in all 50 states and countries half-way around the globe. Although **KUG** is an entirely independent organization, we rely on the information that is passed on to our members from the Kaypro Corporation. That information, as well as information from members and **KUG** staff, is presented in our bi-monthly "**KUGRAM®**" newsletter.

The articles and programs in **KUGRAM®** are aimed at the first time user and the "pro." We have received welcoming comments from both. Our article (tutorial) on CP/M, titled **CP/M STUFF**, is regarded as a fine learning experience in working with the Kaypro operating system. Other columns include **BOX 100** (letters from members), **CHAPTERS** (new chapters from around the world), **IN RESPONSE** (answers to many of the questions we receive), **VENDORS** (suppliers of Kaypro compatible products) and **REVIEWS** of software and hardware for the Kaypro.

KUG also operates its own Bulletin Board system. You can meet and communicate with other **KUGGERS** through this electronic medium. The **KUG** library has an excellent public domain modem program. In fact our disk library has many other catagories such as **GAMES** (Adventure, Pac-Man,

Eliza and more), **UTILITIES** (programs to make your file handling easier), **HELPS** (helpful hints on **MBASIC**, **CP/M**, and other languages) plus others that are constantly being added and updated.

Other services include free information on starting your own local **KUG** chapter (just send a self-addressed stamped envelope to Chapters, Box 100, Malverne, NY 11565), printer configurations for the Kaypro, software and hardware update information and much more.

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SBASIC Learning Disk

Review by David Thompson

After I spent a couple of frustrating hours trying to get a very simple program to compile under SBASIC, I purchased a copy of the SBASIC Learning Diskette from Clifford B. Godley, (doing business as TARP Consulting).

After all, I figured a few good examples would help a lot. What I got was a disk full of tiny programs, each program a good example of how NOT to program in SBASIC. But, before I get to the programs, let's talk about the documentation.

Documentation

There is a manual, of sorts, on the disk. It describes what the programs do and how to compile them. The descriptions are there, I suppose, but the sentences aren't sure of their task, they just sort of fumble along.

The manual was written and formatted for the Select word processor. Any one with the (mis)fortune of having this editor can see the manual all printed and formatted. The rest of us get to pick through formatting commands.

The documentation starts out as follows: (Please note that the following is, error for error, an exact copy of his first paragraph.)

This text is written as a partial guide for applied utilization of SBASIC programming. Learning through the supplied examples can provide the ability necessary for complex programming. As in all endeavors, increased knowledge can lead to superior results or

more efficient application, but programming is best measured by functional output. In the near term, the amount of time necessary to learn sufficient engineering and computer science to fully optimize the language or machine will no doubt serve to significantly reduce the amount of functional output. An alternate outlook for the near term, using this text, is a partial application of SBASIC and the Kaypro to produce functional output.

From here it continues generally downhill although occasionally he actually says something. If you want a good example of a documentation style that sends me to the restroom, take a close look at the above. In fact, this drove me right back to the SBASIC manual—at least it recognizes English as a means of communication.

The Examples

I have seen some examples of really good programming in SBASIC. These good programs would hold their own in any Pascal or C structured programming class.

I have seen many more examples of really bad programming in SBASIC. The bad examples remind me strongly of old time BASIC programming. The programmers simply left out most of the line numbers and turned the rest into alphanumeric substitutes and then figured they were writing good structured code. This is what Godley did.

He mentions in the introduction that his disk is not meant for beginners. You

```
REM PROGRAM TO READ FILES
FILES R(128)
VAR SORT,REC,MODE=INTEGER
VAR KEY,LKEY,DATA1,DATA2=REAL
VAR FILENAME=STRING:15
INPUT "ENTER FILENAME TO PRINT";FILENAME
OPEN #0:FILENAME
INPUT "PRINTER -- OFF=0 ON=1";MODE
IF MODE<>1 AND MODE>0 THEN OINPUT
FOR REC=1 TO 1000
  READ #0,REC,KEY,DATA1,DATA2
  IF KEY=9999 THEN OEND
  PRINT #MODE;KEY,DATA1,DATA2
  IF KEY>=LKEY THEN OREC
  SORT=1
  LKEY=KEY
  NEXT REC
OEND IF SORT=0 THEN OSORT
PRINT "FILE NOT SORTED"
OSORT PRINT "NUMBER OF RECORDS: ";REC-1
END
```

Figure 1 - Example Tarp Consulting Program

see, he feels that beginners should start by picking up standard text on BASIC.

No! No! No! That's like teaching someone to touch type by insisting that first they must hunt and peck for two years. It's obvious that Godley's background is BASIC and that he's going to cripple anyone else who comes into contact with him. See Figure 1 for an example of Godley's style.

Get a Pascal book! Take a Pascal class! If you don't know programming, don't learn BASIC first. (On the other hand, you would do very well learning SBASIC first, if you learn it right.)

So, Godley has missed the primary need. The need is for a text and disk that will help beginners (as well as advanced programmers) get started right with SBASIC.

SBASIC Learning Diskette \$15.75
Tarp Consulting
3851 N 28th St #141-B
Phoenix, AZ 85016



(SBASIC Column continued)

Software Tools gets into advanced programming concepts fairly quickly so I wouldn't recommend it as a first programming book for the rank beginner. However, those of you who feel comfortable with structured languages would really benefit from browsing through this one. (I used this book in graduate school.)

Software Tools is published by Addison-Wesley, ISBN 0-201-03669-X. I paid \$12.70 in the college bookstore.

A course in Pascal at your local college would also be an excellent way to learn good programming skills while getting started with SBASIC. (Don't even whisper the word

BASIC—S or otherwise—in a Pascal class. A lot of people wouldn't understand.) Also check with your local Pascal instructor and see what texts he recommends.

One of the first things you will probably notice about Pascal and other structured languages is that you are strongly encouraged to write programs without GOTOS or GO-SUBS. Pascal does have a GOTO statement but any Pascal freak caught using a GOTO would, no doubt, be sentenced to 5 years hard programming in BASIC.

I strongly encourage all of you (no matter what language you're working in) to totally obliterate line numbers and GOTO/GO-SUBS from your vocabulary. If the language doesn't allow you to do that, then find another language.

At first it'll be hard for those of you who came up through the BASIC ranks to break this stringy habit. However, your programs will no longer reek with the foul smell of old spaghetti when you go back and try to modify the code.

Please, any of you who have written large or small programs in SBASIC (even unstructured), put them on disk and send them in (with source). We'll send you a Kaypro or other disk in return. Free.

Also, remember us with your cards and letters (and in your will) when you find bugs, ways around bugs, etc. Put these smaller hints etc. on paper and send them in. SBASIC is too good to waste, and that is the truth. Ohnystly.



Adventuring Alone

By David (the Troll) Thompson

5 Bridge Path
Plugh, OR

I've received a number of calls from novice adventurers who are going absolutely stark raving mad. This irritating condition usually happens within the first hour and closely mimics the mental condition of a small publisher I know.

If you are trying adventure for the first time without advice from more experienced folks, perhaps I can help. (I'm not the one to ask for really advanced information; I haven't had time to get very far with this one.)

First, be prepared to spend some time. A good friend at Tektronix (Lynn Cochran) is probably the most adept adventurer I know. He spent over 10 hours a day for months before mastering a version of this game called Dungeons. He was willing to try everything that was feasible as well as everything else.

He passed along the following tips that I have found invaluable:

Make a map

As obvious as this is, it's amazing how many people don't do it. There are two ways (that I know of) to make maps. One is to get a very large piece of butcher paper and draw circles or boxes for the rooms as you encounter them. Then use lines (marked N, S, E, W . . .) to connect the rooms together. This method works best for simple adventures.

The other way (which I now use) is to make a chart on gridded engineering paper. I draw a set of columns, the first column contains a number that I have assigned to the room or location. (I assign the numbers sequentially as I discover the rooms.)

The second column contains the name of the room.

The third column lists the objects that I found in the room (sword, the word plugh, etc) along with any special comments about what I can say or do in the room. Note that special phrases you see on walls, for instance, can be used forward, backward, or one word at a time. They may do something only in a certain room under a certain circumstance. They might work magic when used correctly but kill you any other time. If something kills you, don't assume that it is useless. Keep a record of everything that happens.

The rest of the columns are very nar-

row (just room for a number) and they are marked at the top with the directions: N, S, E, W, NE, SE, SW, NW, UP, DOWN and OTHER. The OTHER column is a little wider, so I have room to put magic words and their destination numbers. As I find a new room, I enter it at the bottom of the list and assign it the next consecutive number. Then I put the new number in the appropriate column of the room that I had just left.

One of the main advantages of the chart is that you can see immediately which directions you haven't tried. Enter an 'X' in the directions which don't work, and you won't have to try them again (remember, one of the tricks to this is trying everything).

Words and Objects

I'm sure you've noticed that adventure has a frustratingly limited vocabulary. However, you can take advantage of this.

Any time you find a word that it recognizes—even though the word might not help at all in the present situation—write it down. I'm tickled to death when it says "I don't know how to do that here." Entering random words—one at a time—can be just as productive as exploring rooms.

In many cases, you'll have to do the same kind of sleuthing when dealing with objects. I haven't yet figured out what to do with the food or the magazines, but I'm definitely going to keep them in mind. Meanwhile, I can drop them in the "maze of passages all alike." (The "maze of passages all different" is pretty easy if you read the text closely.)

Save the Game

As you get farther into adventure you'll find that your exploring will go much faster if you save the game once in a while. Simply enter "SAVE" in place of a regular command and you will be terminated (not as bad as it sounds). Don't worry about the "30 minutes" note, you can get right back in. On reentering simply type "RESTORE" when you are outside the building.

When you restore a game, the saved file (ADVD.SAV) is automatically erased (the creators of this program were crafty devils), so if you get into dire straits

and quit, you can't restart again where you were.

However, if you use PIP to make a copy of the saved game (ADVD.SAV) under a different name before restarting, you will be in luck. I called one saved game "OGRE.SAV" because I had just killed the ogre before saving the game (quite a feat I might add). Then I used pip to make a copy of "OGRE.SAV" called "ADVD.SAV" so I could start with a dead ogre at my feet as many times as I wanted.

Of course, once you have saved the game, you can move on with great abandon, stabbing the troll, taunting the dwarves, and jumping into bottomless canyons. When you get killed, it won't hurt so much, just make another copy of the saved game, and you're on your way.

A few tips

Dwarves are pretty easy to dispatch as long as you aren't too loaded down, the bird does interesting things to the snake, and you need a special diet to get the sword.

The pirate is most likely to show up when you are carrying lots of treasures, but you have to let him take something from you before you can find his chest.

If you have a Kaypro II, you can't save a game on your adventure disk because the disk is already full. However, if you put your adventure disk into drive B and use PIP to copy ADV.COM from B to A, then you can erase ADV.COM from drive B. Now log onto drive B and enter "A:ADV" and you'll have room on the disk to save the game.



LETTERS

Dear Editor,

If anyone is looking for a cheap monitor, Rondure Company, 2522 Butler St, Dallas TX 75232, may still have some 9" used Motorola monitors for \$20.00 each. The one I received came with no specs, but it looks like it has never been touched and it works fine. It requires composite video and -12V at 0.9 amp. The two lines coming out of the capacitor are the power connections.

I am looking for a low cost Z80 debugger/disassembler similar to DDT.

Murray Voahes
86 Waterloo St
Waterloo, Ontario, Canada N2J 1X9

Dear Editor,

I have located Falco Data Products Inc. They are at 1286 Lawrence Stations Road, Sunnyvale CA 94086, 408-745-7123. They have a number of very nice terminals but they aren't cheap. Their TS-1 is \$1295 retail. They are intelligent and they do graphics (the terminals, I mean).

Check into the Freedom 100s; they are much better for the money.

Bob Carol
216 Oswego #4
Huntington Beach, CA 92648

Dear Editor,

I found a fellow who can supply parts, information, and repair service for MFE drives. He bought out the factory supplies when it went out of business. He is Richard Brailinger, 51 Washpond Rd. Hampstead NH 03841, 603-839-1921 ext 231. He supports the MFE's as a sideline.

Charles Woodward
3302 Owl Dr
Rolling Meadows, IL 60008

Dear Editor,

I have just ordered my fourth Kaypro disk from you folks and feel compelled to tell you that your products are excellent, the prices are fair, and your service has been outstanding. Well done!

Now, how about a bit of advice? I am new to CP/M and still lack some fundamental knowledge, so a lot of CP/M

seems like magic. I don't understand how the CP/M disks are organized, hex is beyond me, and I'm unclear about tracks, sectors, groups, etc. I can PIP, DUMP, FINDBAD, and FIX but I don't know what went wrong in the first place. Can you recommend, or better yet, sell me a good CP/M book? There are so many on the market.

LCDR John Connell, Jr
Executive Officer
USS Vreeland (FF 1068)
FPO Miami, FL 34093

Editor's note:

Yes, John, I can recommend a very good book. Get a copy of Inside CP/M by David E. Cortesi (ISBN 0-03-059558-4). This book will take you from the very basics of CP/M to the depths of disk parameter blocks and programming interfaces. It is well written and well organized.

We are trying to arrange to sell this book (my copy is so popular that I usually can't find it) but for now, you'll have to get it elsewhere.

Dear Editor,

I got Beigun and Associates EPROM programmer and I'm very pleased with it. It is totally menu driven and there are

no jumpers to change when switching EPROM types. I got so excited, I used up all my EPROMS. Otherwise I'd send in this note in a 2716.

J.L. Mangrum
30904 8th Ave S
Federal Way, WA 98003

Editor's note:

I wondered why there has been a shortage of EPROMs lately. (Obviously someone needs to loan you an eraser, quickly.)

Dear Editor,

The broken drive door latch really hit home. I was getting write errors so I removed the drive and discovered the broken hinge. No glue would work (I should have thought of the soldering iron trick). Anyway, I found some coat-hanger wire and made a temporary fix.

I ordered the Tandon manual, which now costs \$29.95, up front. I could find no dealer who would sell me the latch and I got the usual quote of \$40 to \$50 to have them install the parts. I may be desperate but I refuse to fatten rip-off artists. I guess we have to pressure Tandon to make a better latch. (Or are they looking for the 1000% markup on a 10 cent plastic part? We aren't all as rich as the

BIG BOARD DUAL DRIVE ENCLOSURE

Because of the unprecedented popularity of the original Big Board, we felt there would be a good market for an attractive yet low cost custom enclosure. We have had designed THE perfect enclosure for your Big Board and two eight inch drives.

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Limited Qty. of mating PAMOTOR 8500D muffin fans avail. at \$12. Limited Qty. of CDE APF600CEE 6 amp AC 3 wire receptical and line filter that fits our enclosure are avail. at \$3.50 each.

Limited Qty. of 50 conductor dual disk drive ribbon cable and connector assemblies for your Big Board. These feature **GOLD** Winchester Electronics connectors! \$15 each.

Add extra \$1 UPS on above 3 items. We accept VISA, MC, money orders, or cash. Personal checks OK but cause an extra 2 week delay for clearing. Texas residents add 5% sales tax. We ship to USA and Canada only. \$15 min. order. No phone orders yet

ODD BALL ELECTRONICS
P.O. BOX 879
DUNCANVILLE, TEXAS 75116

department of defense.)

Thanks for the excellent magazine and for inspiring me to tear into my Kaypro. It ain't easy to take a screwdriver to over a month's salary without encouragement and reassurance!

William Fletcher
1531 Stinnett Road
Huntingtown, MD 20639

Dear Editor,

I'd like to see more high-tech advertising in Micro C. I like to read ads from small companies with something special in terms of price or product. I buy as much through Micro C as through Byte.

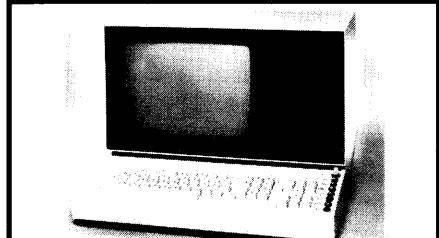
Also, I'm starting my own business: a computer repair and speed shop. It's called "Your Computer Works."

Charles Johnsen III
19704 E Loyola Circle
Aurora, CO 80013

Dear Editor,

I'd like to get into touch with other people who have Andy Bakker's BB I winchester interface. Let's share information.

Karl Hoffman
1260 N University Dr
Plantation, FL 33317
305-474-6704 weekdays



12" GREEN ball brothers TV-12 monitor in enclosure 19×16.5×14". Room for mounting BB1, BB2 & X820 type SBC's; 8" drive(s) & power supply (see below). Needs +15 Vdc @1.2 Amp, Non composite (separate sync) input. Used & 100% Tested.

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Matching keyboard & enclosure 19×4×5", 77 keys. Non-functional lighted pushbuttons on far right missing. sold only with monitor.

KEYBOARD & ENCLOSURE (6#) \$45.00

Unregulated power supply; outputs: 9 v @ 10 A, 30 vct @ 2 A, 18v @ 1.5A, 14 v @ 0.5 A. Includes transformer, capacitors, rectifiers & heatsinks. Add 3 terminal regulators for cheap power. Removed from used equipment.

UN-REG POWER SUPPLY (25#) \$15.00

Regulated power supply: 6 outputs: 5v @ 4 A, +/− 12 v @ 0.2 A, +24v @ 1.2A, −24v @ 0.2A, +15v @ 2.6 A. 14×4×3", 10 lbs. New.

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PO BOX 60, Rome NY. 13440
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Dear Editor,

It should be possible to set up the disk controller for any stepping rate, even 3 ms on a 1771. The trick is to use the step-in, step-out, and force-interrupt commands.

The code should be fairly straightforward. If you think there would be any interest, I could write a patch for PFM either as a .COM file or as an addition to the CBIOS. The columns on C are great!

Wesley Ebisuzaki
550 Memorial Dr 16E
Cambridge, MA 02139

Editor's note:

Yes, Wesley, I'm interested. A number of drives are much quieter and, of course, much faster at 3 ms. 6 ms is the fastest that a 1771 will normally go, so it would be neat to see the drives really fly.

Dear Editor,

I installed a factory upgrade kit on my Kaypro 10 (purchased in September) because I couldn't get it to boot off the floppy (and I was getting strange errors). The kit was free and the hardware was easy to install.

The software was a little more difficult until I figured out that I needed to boot the 10 off the new system disk (rather than the winchester) before I ran the install program that came with the kit.

The errors have vanished and I can boot off the disk drive. However, now I have to hit the escape key three times to get into the system.

Anonymous

Editor's note:

I try to make sure that people's names get on their letters and other submissions, but sometimes I miss. Thank you Mr/Ms Anonymous for the important information.

Please, everyone, put your name and address (phone if you'd like) on all submissions. That way you can receive due credit.

■ ■ ■

Dear Editor,

I am a ham and would like to interface my Kenwood TS-180-S to my Kaypro so I can send and receive RTTY (radio teletype). Plus, I would like to keep my 10-10 numbers in the system and list them by call or number. Is anyone else working on this kind of project?

Edward S Beer N6IGZ
127 E Louise #7
Long Beach, CA 90805

Dear Editor,

I am interested in working with someone on a CW/RTTY interface for the Big Board/Xerox 820. I could handle some of the software.

David Howard
8787 Stemmons Fwy
Dallas, TX 75247
214-245-1327 (home)

Editor's Note:

I too would like to see such an interface. It would make a great article for Micro C because quite a number of readers are hams (when not computing). An interface that would work on the Kaypro would also work on the BB I and Xerox 820-1. Anyone wanting to participate should contact David Howard.

Dear Editor,

I purchased a keyboard from D&W Associates and it has about 600 wires coming out of it. They send a sheet of paper explaining which wires are which, but I still don't understand which wire attaches to which pin on the BB I. If anyone has a D&W keyboard and has figured out an exact wire for wire connection list, I would very much appreciate a copy.

Gerald Brandt
484 Newman St
Winnipeg, Manitoba, Canada R3G 2V5

RENT SOFTWARE! HUNDREDS OF PROGRAMS AVAILABLE TO COPY!

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Your Fortune in the Microcomputer Business \$26.45 (US, Can, Mex)
\$36.45 (Other foreign)
This is the best, most complete collection of "working for yourself" information I've found (and I've heard nothing but good comments from those who have received it). This two-volume set is a perfect for those blustery fall evenings when you snuggle up in front of the fire and dream of great riches.

Micro Cornucopia
P.O. Box 223
Bend, OR 97709
(503) 382-8048



BB II DRIVE INTERFACE

For 5 1/4" and 8" Drives

Andy Bakkers is making this special software package available through Micro C. Complete source, HEX, & documentation files on an 8" SS SD disk. Also outlines on disk the hardware changes needed.

\$29.95

BB I, BB II, and XEROX 820 USERS DISKS

The following are full 8" disks of software. Each program has a .DOC (documentation) file and many come with source.

USERS DISK #1

- 1-Two fast disk copiers
- 4-Two disk formatters
- 2-The manual for Small C+
- 5-Modem 7
- 3-Crowe Z80 Assembler
- 6-Othello
- 7-Serial print routine-B

USERS DISK #2

- 1-Two single disk drive copy programs, both with source
- 2-Crowe Z80 Assembler source
- 3-New Crowe.COM file, debugged version
- 4-New CBIOS with parallel print driver & other extensions for CP/M 1.4 & 2.2
- 5-Disk mapper with source

USERS DISK #3

- 1-EPROM burning software for BB 1
- 2-Reset bit 7 (unWordStar a file)
- 3-Disk fil CRC checker
- 4-New fast copy program & source
- 5-DU77, disk inspector/editor
- 6-FINDBAD, isolates bad disk sectors
- 7-Print fancy page headings

USERS DISK #4

- 1-CBIOS, custom bios for Tandon drives
- 2-ZCPR, dynamite CCP checks drive A for missing .COM files; improved commands
- 3-ZCPRBLOC, identifies CCP location

USERS DISK #5

- 1-CAT, disk cataloging routines
- 2-Modem 7 for Port A
- 3-Modem 7 for Port B
- 4-PACMAN, the arcade game
- 5-FAST, buffers the disk to speed up assemblies
- 6-NOLOCK, removes BB 1 shift lock
- 7-VERIFY, cleanup & verify a flaky disk
- 8-DUMPX, enhanced for BB 1
- 9-UNLOAD, create .HEX file from .COM file

USERS DISK #6

- 1-REZ, 8080/Z80 disassembler, TDL mnemonics
- 2-PRINTPRN, prints Crowe listings
- 3-RUNPAC, run-time utility package for 8080 assembly language programs. Has 51 functions. Includes source which assembles under ASM.

USERS DISK #7

- 1-CHNGPFM, PFM monitor mods
- 2-TERM, terminal routines let you set up BB as simple terminal, as a file receiver, or as a file sender
- 3-Checkbook balancing package
- 4-Disk Utilities - copy to memory, from memory, and dump.

USERS DISK #8

- 1-BDSCIO, custom BDSC I/O for BB 1 (both .h and .c)
- 2-YAM, Yet Another Modem program in source & .COM form. Turns BB into paging intelligent terminal, complete with printer interface, baud rates to 9600.
- 3-ROFF, text formatter
- 4-SIGNS, prints large block letters

USERS DISK #9

- 1-ADVENTURE, expanded 550 pt version
- 2-Keyboard translation program
- 3-CBIOS, serial & parallel printer interface
- 4-EPROM programming package for BB II, for 2732s only

USERS DISK #10 - Lots of Disk Utilities

- 1-REBOOT, sets up the CP/M auto load
- 2-SWEEP, directory/file transfer routine
- 3-A, Lets BB I recognize a double sided drive as one drive with 494K of usable space
- 4-FIX, super disk utility, does everything, much easier to use than DU77
- 5-Compare files routine
- 6-UNERA, retrieve erased files
- 7-FIND, check all drives on system for a file
- 8-MENU, menu program for CP/M
- 9-NEWCAT, enhanced disk catalog program
- 10-Single drive copy program that does track by track copies rather than file by file

USERS DISK #11 - Printer Utilities

- 1-Microline 92 printer routine
- 2-Graphics display package for MX-80 with Graftrax, very fancy
- 3-Epson MX80 setup for BB 1 with 59.5K CP/M
- 4-Epson MX8 setup for any CP/M, lets you set print modes.
- 5-Micro Tek print driver, Ports A & B

USERS DISK #12 - Games for BB I

- 1-ALIENS, a fast, exciting arcade game
- 2-ZCHESS, chess with a 1-6 level look ahead
- 3-MASTERMIND, match wits with the computer
- 4-BIO, Biorhythm charts complete with graphics on the BB I
- 5-LIFE, so fast it's real animation!
- 6-CRAPPS, see how much you'd lose in Vegas
- 7-WUMPUS, a caver's delight, kill the Wumpus or be killed
- 8-PRESSUP, similar to Orthello
- 9-Games, 7 games in one program, includes blackjack, maze and animal

USERS DISK #13 - General Utilities, BB 1

- 1-ZZSOURCE, disassembles to real Zilog mnemonics
- 2-EX14, superset of submit or supersub
- 3-MOVPATCH, lets you use MOVECPM on other copies of CP/M
- 4-XMON, 3K expanded BB I monitor, use in ROM or as overlay .
- 5-CURSOR, prompts you for cursor char you want
- 6-UMPIRE, very fancy RAM test
- 7-ZSIDFIX, display improvement for ZSID
- 8-PIPPAT, modify PIP so you can reset system from within PIP
- 9-@, Lets you use the BB as a calculator, including HEX
- 10-SORT, sort package written in C80.

USERS DISK #14 - BB II Software

- 1-PRO32, latest 73/74 reader & programmer
- 2-SMODEM2, lets BB II talk to Hayes Smartmodem
- 3-GRAFDEMO, demonstrates BB II graphics (in BASIC)
- 4-ATTRTEST, demonstrates BB II graphics (in JRT Pascal)
- 5-INITSIO, initializes port B for 300 or 1200 baud
- 6-MENU, displays menu of .COM files, enter number to run file
- 7-SETCLK, sets realtime clock built into BB II
- 8-PRINT2, modified print which accesses BB II clock
- 9-BOX, draws a thin line box on screen determined by HL and BC
- 10-ALIENS, space invaders arcade game
- 11-LISTSET, printer interface, auto-enables RTS, ignores DCD.

USERS DISK #15 - Word Processing

- 1-EDIT, very fancy line editor similar to EX (Unix). Includes help menu, programmable key, and full manual on disk.
- 2-TED, simple minded line editor, easy to learn & use. Very fast.

- 3-TYPE, typing training program written in BASIC
- 4-TINYPLAN, very simple-minded spreadsheet. Whets your appetite for a fancy one.

- 5-C80 Text Utilities

- 6-CHOP, cuts off file after N bytes
- 7-ENTAB, replace spaces with tabs where possible
- 8-MS, double or triple spaces a file to output
- 9-RTW, removes trailing spaces from file
- 10-TRUNC, truncates each line to specified length
- 11-WRAP, wraps at column 80, plus pretty pretty printing, page #s . . .

USERS DISK #16 - BB I Modem Software

- 1-RCPM27, list of U.S. bulletin boards
- 2-SMODEM, interfaces BB I with Hayes Smartmodem
- 3-PLINK66, easy to use with non-CP/M host, for port A
- 4-BBPAT, menu selection of BAUD rate, bits/char, parity, & stop bits
- 5-MODEM 7+, Modem 7 plus BBPAT, lets you talk to anything from port A

USERS DISK #17 - Small C version 2

SMALLC2, this substantially expanded version of Small C now includes for, goto, label, switch (case); external declarations; new preprocessor commands; expanded I/O includes redirection; initializers; plus 12 new expressions. The I/O and runtime libraries have been greatly expanded (including printf). Source & documentation on one full disk.

USERS DISK #18 - FORTH

IFORTH, this is Idaho FORTH which can be burned into ROM or loaded from disk. It replaces the PFM monitor & handles all the monitor functions. See issue #11 FORTH column for more info about IFORTH and this disk.

USERS DISK #19 - BB I Double Density

New BB I Monitor, BIOS, character ROM, Winchester Interface, ZCPR, and formatter from Trevor Marshall. See BB I expansion article in issue #11.

USERS DISK #20 - Assemblers

CROWEASM: This is the Crowe assembler modified so that it runs on any CP/M system (including the BB I, BB II, Xerox . . .). Includes .COM .Z80 and .DOC files.

LASM: This assembler is similar to the ASM that comes with CP/M except that it can link files at assembly time.

PRINTPRN: Print routine for CROWEASM .PRN files.

LIBRARY: Utilities which let you combine many files into one, then you can run, type, or extract any file within the larger system.

USERS DISK #21 - Winchester Utilities

BACKUP: Helps you back-up the winchester onto multiple floppies. Creates a catalog of the files on each disk and includes the date of the latest backup. Will not back-up an unchanged file more than once. Plus many more super features.

FLOPCOPY: Lets you make floppy copies (with only one floppy drive) by using the winchester as a buffer.

BIGBURST: Backs up a very large winchester file onto multiple floppies. Joins the copies to recreate the original file.

MULTCOPY: Use this like PIP but it prompts you to change disks. Accepts ambiguous file names.

MDIR: Displays files in all user areas on selected drive. Many features.

MAKE, MOVE: PIP-like utilities that make it easy to move files between user areas.

SWEEP: The famous disk cleanup and transfer routine that does just about everything you can do with TYPE, ERA, DIR, and PIP.

UNSQ: This is the latest, greatest file unsqueezer. Enter UNSQ *.* and it will check every file on the disk. All squeezed files will be unsqueezed.

8" Users Disks

\$15.00 each

OTHER GOODIES

Screen Editor in Small C \$39.00

A simple but full-function screen text editor plus a text formatter, all written in Small C by Edward Ream. This package includes the editor and formatter .COM files setup for the Big Board, Small C itself, and source code for all. With the documentation this is over 400K on a floppy disk. Edward is selling this package for \$50, you can buy it from us for \$39 (and Ed gets a royalty). Where else can you get an editor, a formatter, a C compiler, and source for all, for under \$40?

More ROMs: Fast monitor ROMs for speed freaks and our famous 'better than Texas' character ROM (V2.3) for screen freaks.

Fast Monitor ROM BB1 \$29.95

Deluxe Character ROM BB1 or

KayPro \$29.95

From Micro Cornucopia

CP/M-86 DISKS

DISK 86-1 — Disk Utilities
D.CMD/A86, SD.CMD/A86, XDIR.CMD/A86: Three extended directory programs. Each does it differently, so we included all three.
FILE-EXT.CMD/A86: Disk status program with good display format.
PAGE.CMD/A86: A text paging program. Displays 24 lines at a time.
PRINT.CMD/A86: File printing routine. Puts a header at the top of each page along with page number and file name.
MUCHTEXT.CMD/A86: Counts words and lines in a text file.
ERQ.CMD/A86: Selective file erase program. Displays all selected files and then asks you one at a time for a Y/N.
INUSE.CMD/A86: Prints "In Use" on your terminal and asks for a password. It will not release the console until you enter the password.
FINDBAD.CMD/A86: Finds and collects bad sectors on a disk. If there are no bad sectors, information on the disk is unaltered.

Disk 86-2 — DU and Modem Programs
DU-V75.CMD/A86/DOC: This is the popular disk utility from CP/M 80. It lets you read, write, and modify disk sectors.

MODEM4.CMD/A86: This is a modem program set up for the Slicer. This program includes a built-in help file.

MODEM7SL.CMD/A86/DOC: No modem disk would be complete without this standard. This is modem7 set up for the Slicer. It displays a menu when it is called.

Disk 86-3 — Small C

C86.CMD: This is the original Small C compiler which appeared in Dr Dobbs Journal in 1980. It runs under CP/M-86 and generates 8086 source for the ASM86 assembler.

C86.COM: This is the C86 compiler which runs under CPM-80. This 8080 program produces 8086 assembly language.

C86LIB.A86: This is the C86 I/O library.

SMALLC86.DOC: Documentation on Small C.

C????.C: Source of the C86 compiler.

Plus, there are a number of demonstration files and ENTAB (insert tabs in place of spaces) and DETAB (replace tabs with spaces) programs all written in Small C.

REMEMBER

FREE Users Disks in exchange for submitted software or articles

KayPro Schematic

This is a complete schematic of the KayPro, logically laid out on a single 24" x 36" sheet — no more searching to see where a signal goes or comes from. Even the unused gates are shown.

It's drawn in positive logic, lines are labeled, and we've tossed in hours and hours of careful checking for accuracy. Then we added a **Theory of Operation** that's keyed to the schematic.

KayPro Schematic Package \$20.00

8" CP/M-86 Disk

\$15.00 each

KAYPRO II USERS DISKS

The following are full disks of software assembled specifically for the KayPro II. Each program has a .DOC (documentation) file and many come with source.

5" KayPro Disks

\$12.00 each

KayPro Disk K7

Small C Version 2 Compiler

This is a greatly extended version of Ron Cain's original C compiler. Version 2 includes many more expressions, a substantially extended library, and much more. This disk contains the compiler, documentation, and library.

KayPro Disk K8 - Small C Version 2 Source

More of Small C Version 2. This disk contains the compiler, documentation, and the source of Small C version 2. It compiles itself.

KayPro Disk K9 - ZCPR

ZCPR: The big news on this disk is the self-installing version ZCPR available only from Micro C. Once you have ZCPR in your CP/M, you'll never go back to straight CP/M! For instance, ZCPR searches drive A for any program not found on drive B, so, even an empty disk in drive B appears to contain every program on A. It's great for text editors, compilers, etc. Plus many more new features to make CP/M easier to live with. In fact, Digital Research incorporated many features of ZCPR into CP/M 3.0.

PASSWORD: Lets you encrypt and decrypt your precious files. Includes source.

EX14: a super replacement for SUBMIT and XSUB. Plus many more: TREK, FIX, FIND, SNOOPY, ALIENS and DIF2.

KayPro Disk K10 - Assemblers

We've received a lot of requests for a Z80 assembler. So Dana put in some long hours getting the Crowe Z80 assembler to run on the KayPro (and every other Z80 machine).

CROWECPM: This is a first class Z80 assembler. We use this assembler daily (and we included its source). Takes standard Zilog mnemonics.

LASM: This is a more powerful version of the ASM assembler you received with the KayPro. This will link multiple programs together at assembly time.

PRINTPRN: This program makes it easy to print the listing files generated by the Crowe assembler.

KayPro Disk K11

Library & Checkbook Programs

We've had excellent response to both these programs from Big Boarders and numerous requests from KayPro folks.

CHECKS: This has been a very popular group of programs. Categorizes checks so you can keep track which are tax deductible and which get charged to which projects. Includes source and excellent example check files. Very powerful.

LIBR: This is a complete set of library routines which let you group files into a single file called a library. Then CP/M sees them as a single program, but with the library routines, you can list them out separately, run them separately, or divide them up again. Almost like a unix environment.

DISPLAY, VLIST, PGLST: Additional screen and print utilities.

KayPro Disk K12 - FORTH

Yep, this is FORTH, one of the most unique, most extendable languages known, and for a paltry \$12.00. This disk contains not just one FORTH, but two, along with an editor, decompiler and 8080 assembler! The editor even uses the cursor control keys.

FORTH: This is true fig-FORTH.

KFORTH: A very nicely extended version of fig-FORTH.

PLUS, all the rest of the FORTH goodies. (Forth Heaven!)

KayPro Disk K13

Source of fig-FORTH

All this disk contains is the 40K ASM source of fig-FORTH with the hooks in place for the KayPro. This disk is for FORTH hackers who just can't leave anything alone. (Look, you probably have faults, too.) The source of FORTH is here because there isn't room on K12. This is the only disk that isn't stuffed.

KayPro Disk K14 - Smartmodem Programs
This is the disk for you if you have a Smartmodem compatible modem. With this disk you can communicate with anything but a recalcitrant spouse. Handles goodies like autodial along with multiple directories.

SMODEMK: Smartmodem program set up for the KayPro (and source).

XMODEM: Lets you remotely control your KayPro from a distant computer.

KAYTERM: This is the information you need to run or write modem software on the KayPro.

KayPro Disk K15

BACKUP: Helps you back-up KayPro 10 Winchester onto multiple floppies. Creates a catalog of the files on each disk and includes the date of the latest backup. Will not back-up an unchanged file more than once. Plus many more super features.

FLOPCOPY: Lets you make floppy copies (with only one floppy drive) by using the Winchester as a buffer.

BIGBURST: Backs up a very large Winchester file onto multiple floppies. Joins the copies to recreate the original file.

MULTCOPY: Use this like PIP but it prompts you to change disks. Accepts ambiguous file names.

MDIR: Displays files in all user areas on selected drive. Many features.

MAKE, MOVE: Pip-like utilities that make it easy to move files between user areas.

SWEEP: The famous disk cleanup and transfer routine that does just about everything you can do with TYPE, ERA, DIR, and PIP.

UNSQ: This is the latest, greatest file unsqueezed. Enter UNSQ *.* and it will check every file on the disk. All squeezed files will be unsqueezed.

NEW!

KayPro Disk K16 — Pascal

This is a public domain version of Pascal and though it doesn't include floating point, records, or pointers, it does generate a real .COM file and it compiles itself. All the source is included, as well as example Pascal programs.

NEW!

KayPro Disk K17 — Z80 Tools

XLATE2.COM.MAC.DOC: Translates 8080 assembly language into Z80. Output can be used by Crowe assembler.
DASM.COM.MAC.DOC: Easier to use version of the disassembler on disk K2. Generates Z80 source.

On Your Own

By David Thompson

Something very important came in the mail on November 27th. It came quickly though it came from a company that has (up to now) been very slow about sending out anything. It was a bankruptcy notice.

JRT Files Bankruptcy

JRT Systems has filed chapter 11 bankruptcy. I know many of you waited months for your Pascal while JRT sat on your checks and Visa cards (or is still sitting on your checks and Visa cards). I guess we now have an inkling why.

Growth, the Good and the Bad

JRT Pascal was an incredibly successful product by most measures. There are lots and lots of copies out there generating lots and lots of P code. I talked to Gary Peiffer at JRT systems and he told me that they averaged 500-600 orders a week for version 3.0 during the first quarter of 1983. During their best week, they received orders for 1192 copies. That's not bad, even at \$29.95 per copy.

However expenses managed to keep up with the revenue. They began doing a lot of advertising, they moved into larger quarters and they hired new employees (at the peak, there were 11 people working at JRT).

They had announced version 3.0 in January but it was March before it was ready to ship. JRT was getting a reputation for slow shipment. Plus, people were finding that it was much easier to find a friend and get their own copy (copying is OK, you know) than to wait for JRT to ship orders. So, by June, the order rate was down to 200 per week. (It has stayed pretty constant since then.)

More Headaches

The optimistic product announcements and slow shipments weren't the only problems. They were contracting out the disk copying and they were supporting many different disk formats. Of course, any time the copying service had a quality control problem, it became JRT's quality control problem. Also, the multitude of formats made stocking disks a real nightmare.

They grew rapidly, so they weren't careful enough about the people they hired. I understand that poor employees

caused many additional problems.

What did JRT systems learn? Hire carefully—really check people out before taking them on. Don't announce products before they are really ready. Ship orders immediately. Do your own disk copying. Keep the number of disk formats to an absolute minimum (they are now shipping only 8" SSSD, 5" Kaypro, 5" Osborne, and 5" Apple). (Also, they are now down to 5 employees, plus Jim.)

What does Chapter 11 Mean?

A chapter 11 filing means that the company gets protection from its creditors (including you folks who paid for software but haven't received it yet) for approximately 6 months.

JRT's creditors will have to wait while JRT comes up with a plan to make the business viable and pay off its debts. JRT systems has 6 months (or more if they get an extension from the judge) to come up with a plan that satisfies the court. If JRT doesn't come up with a plan satisfactory to the court within the allotted time then the creditors can file their own plans.

What does all this mean to those of you who placed orders?

If you placed an order on or before Nov 18, 1983, you'll have to wait. Your wait may be fairly short if the judge lets JRT start shipping back orders. But if that doesn't happen, you might wind up waiting a long time—anywhere from 6 months to a year (or forever if they don't survive).

If you placed an order after Nov 18, you are not part of the chapter 11 action and you should get your order sooner.

Gary mentioned that they are trying to ship version 4.0 within 48 hours (version 4 is a somewhat upgraded version 3 which they are selling for \$69.95). The ads say that the version 4 is twice as fast as version 3. The compiler is twice as fast, the program will run the same speed as it would under version 3. (And the compiler's output is not object code, it's P-code which requires a run time interpreter).

He mentioned that they were also trying to ship version 3.0 faster (but not as quickly as version 4). The price of version 3.0 has been raised to \$39.95.

Gary said they were expecting to start shipping Modula II by the end of December (it's been advertised since September). It will be a P-code compiler and interpreter combination like their Pascal. Chances are, they are using much of their Pascal code in creating the Modula II. Modula II will sell for \$99.95.

Something Learned

Probably the most important lesson we can learn from the bankruptcy is that success of a product is no guarantee that the business will survive.

Look at Osborne and now JRT. Probably the biggest problem new companies have is the temptation to spend money before they've earned it. It's awfully easy to let the outgo catch up with the income. (After all, income is continuing to rise, right?)

It would be very easy to make that mistake here at Micro C. We receive a year's subscription up front. That's cash in the bank that we could spend.

Fortunately, Sandy is very good at accounting (and very strict with the purse strings). The money you send in for a magazine does not become earned revenue until we send you the magazine. With each magazine you receive, we earn 1/6 of a subscription.

That way, even if all of you cancelled at once we'd have the money to refund all the issues you didn't receive. (Please don't do it, though, I'm not sure I could go back to a straight job. This is just too much fun.)

Other Computer Businesses

I talked to Ms Hardin who is a legal assistant with the firm that is handling JRT's chapter 11 filing.

She said that Osborne and JRT appear to be just the tip of the iceberg.

"There are so many software companies out there that aren't savvy about profit and loss that we will be seeing many new bankruptcies in the near future," she said.

"There are too many elements that aren't within their control. IBM or DEC can come out with a new product or withdraw a product and these companies are left without a market."

She also mentioned that it is so easy to start a new software operation with little

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2021	Z-80 adaptor & software for all CP/M computers	300.
2021.A	Apple adaptor & software specify DOS or Pascal	200.
2021.B	IBM adaptor & software	200.
2004	power supply harness	20.
2007,8	50 pin cable interface to crt'l with disconnect	45.
2005	34 pin cable	20.
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or no capital that many of these start ups have no way to weather hard times.

Update on BCN

I got a call from Richard Kost of Business Computer Network. He had heard that I had mentioned BCN in this column and he wanted to let me know how they were doing.

Well, BCN has had a product on the market for two months now and already they are talking about going public (you know, a stock offering and so forth). A public offering, if it goes, usually makes a lot of paper work for the company and a lot of money (millions) for the original owners.

He said that they really have distributed about 65,000 copies of their software on disk and, now, two months later they have almost 2,000 subscribers to their service and they are getting between 25 and 50 new customers a day. They aren't breaking even yet, but they are not only optimistic about this product, they are already working on new products.

More Ideas

They are also working on a hardware/software package that will let people

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connect up with the big networks. It will be complete, terminal and all, and it will be cheap.

How cheap? He doesn't know yet, but it might be something ridiculous like \$7.95 and three Campbell's soup labels. (They'd donate the labels to a charity.) Of course, then they'd sell network time to the new users. It would make sense for them to pick up a bunch of surplus Timex/Sinclair systems (they retail here in Bend for \$12), add a little communications software and a home TV and customers would have a complete system.

BCN is also finishing up a modem package for the PC which they plan to distribute on free disks just as they did for Kaypro. (IBM has found that a large majority of PCs have gone to businesses so BCN is probably on the right track.) Richard also mentioned that another project will be aimed at Europe, but he wouldn't say what it was. Whatever it is, anyone thinking that big is definitely worth watching.



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(continued from page 1)

32 16K bit RAM chips; this made the board smaller. They also replaced the 1771 single density floppy controller with a 1793 double density package. They also removed the three ICs that handled the scroll in the video circuit.

They left all the ports and port addresses as they were. In fact, the Kaypro II and 4 have two PIO chips. They are using half of one for the parallel printer interface and half of the other one for system control. They could have used just one but the BB I had two PIOs. (Stick around, we'll be using the other half of those two in the near future.)

They had to rewrite the monitor routines and the BIOS because of the changes. They had to support double density 5" drives and they had to handle screen scrolling in software.

The choice of double density was very important since it gave the Kaypro II a very definite edge over the Osborne—the 9" screen and 80 columns were also a very good choices—but the choice of software scroll was unfortunate.

Try using the Kaypro as a terminal and set the baud rate over 1200. Once the screen fills, it starts dropping characters each time the screen has to scroll. You see, the processor has to move every character in video memory during a scroll (which takes a while). Meanwhile, the Z80 ignores all about the characters that are coming in the serial port.

With the hardware scroll, the video circuitry automatically shifts everything by one line and points the processor to the correct spot in video memory. The processor doesn't have to so much as raise an address line.

One of the big reasons that speeding up the Kaypro processor improves the performance so much is this silly scroll problem. The Z80 spends most of its time just rewriting the screen. If you purchase one of the many speed-up boards that slows down to 2.5 MHz when writing to the screen, you don't gain much.

Documentation

Non Linear found it easier to produce systems than service manuals. So, it was not unusual to find a Kaypro dealer with a set of Big Board schematics, trying to translate the IC numbers from one sys-

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tem to the other and trying to figure out what was left in, what was left out, and what changed. Somehow it all seemed very familiar.

Character Sets

The evolution of the BB character set is also worth a look. The first BB I boards shipped by Digital Research had an interesting character set. The uppercase characters were very standard uppercase characters. The lower case characters were simply shorter versions of the uppercase. A screen full of text looked very strange—and if you had all one case or the other, you really had trouble telling which you had.

Well, a group of us at Tektronix had placed an order for 7 boards right when the first ad hit the mags. Ours was the first order out the door and I have board A000014.

Anyway, we didn't appreciate the character set, so I took a few minutes one afternoon (with the help of Randy Dietrich and Lynn Cochran) and came up with a real lower case character set. It wasn't very fancy—the y, g, and q were just plain ugly—but the screen looked ten times better than before, so everyone in the group asked for a copy.

I told Jim Tanner that I had changed the characters. He said they were working on a new character ROM themselves and he asked if I would exchange my character ROM for a copy of his when he finished with it.

So I sent him mine. Six months later I called him to find out what had happened to his. He told me not to worry, they had decided to ship Big Boards with my character ROM (he calls it version II).

I mentioned that I had been hoping to sell my character ROM as a way to help finance the start up of Micro Cornucopia. So there I was, my first new product for the BB I was being duplicated by the

hundreds and shipped with every new board. (He sent me a BB I kit as payment.)

So I went back to work on the character set and cleaned up the tail dragger that looked so unique (and ugly) and advertised the upgrade in Micro C. The response wasn't earth shaking, but it has helped us get started.

Then one day a friend suggested I take a look at the Kaypro. Well, looking at the Kaypro screen was like homecoming. There were my ugly g, y, q, f, t... There was no doubt about it. I knew that within that Kaypro there lay a heart of BB I and inside the character ROM were the remnants of an afternoon at Tek.

So I combined my new character set with the Kaypro Greek characters and produced the Greek PRO-CHARACTER ROM. I also left out the special characters altogether and called it the Clean PRO-CHARACTER. The Clean character set was for those who were being driven to distraction by the funny little greek characters (mostly folks into data communications with mainframes.)

I sent a copy of my character ROM to Non Linear (after getting a non-copying agreement from David Kay). They have upgraded their characters somewhat since receiving mine but they haven't gone all the way with it.

Finally

This is just an overview of the BB I. There have been, for instance, a number of other duplications by user groups and commercial companies.

There are a lot of people who still swear by their original BB I. My old #14 still turns out all the 8" user disks that go out of here and keeps the books on the side (it accounts for itself better than a lot of people I know—and some of my best friends are people).

The BB I was unique in its time. Since

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S-100 was the power in the CP/M world three years ago, a single board "unexpandable system" was a break with tradition. The BB I was much smaller than the equivalent S-100 hardware because it was designed with LS (low power schotky) parts which used about 1/10 the power of the standard TTL parts. LS parts could be packed closely together without heat problems and lower power drain meant that power supplies could be much smaller and cheaper.

It turned out, however, that you don't tell a Micro C reader that something is unexpandable—at least not without major consequences. So there are BB I's that bear little resemblance to their original form.

People have added 256K, RAM disks, 5 MHz clocks, double density drives, 8088 co-processors, and 20 Mbyte winchesters. Now folks are working on full blown CP/M 3, MS DOS, and (no doubt) Unix.

It's too bad the BB I is so limited.

S-BASIC

John Steinhauser was very kind to volunteer to do the first S-BASIC column. His introduction to this fascinating lan-

guage is in this issue.

I'd like to put together folks who would like contribute to the column. I'm especially looking for S-BASIC programmers who have a strong background in Pascal. When BASIC programmers see what happens when they totally leave the line-number/goto style of coding and write really structured code they usually never go back. But the transition is sometimes difficult.

Also, I especially encourage you heavyweight Pascal types—who can leap tall algorithms with a single call, write 10,000 lines of code without a goto, and spot spaghetti coding at 100 paces—to try this language.

I'd like Micro C to become a clearing house for S-BASIC information and programs. It's certainly a very exciting language and this is certainly the right group of people for it.

Third Annual SOG

The third Annual SOG (Semi Official Get-together) will be July 27, 28, and 29 here in Bend. We are now working out the details, but we have already lined up a large log building with a kitchen, balconies for seminars and lots of covered

space for people to display what they've been working on for the Big Board, Slicer, and Kaypro.

The building is on the site of an old fish hatchery. The hatchery is no longer there but the river and a large pond are still there. It's a very quiet and beautiful spot about 2 miles west of Bend.

We are going to have another white water raft trip. It is absolutely the best way to get acquainted (or reacquainted) with all those great folks who are building and writing and modifying, and expanding these neat systems.

You'll also get to see the new Micro C office. It's a cute little house in downtown Bend and we're just about moved in. More about moving Micro C out of our house for the first time in future issues.

Anyway, put the last weekend in July down on your calendar. This is one of the most popular areas for exploring, fishing, camping, sightseeing, and skiing in the Northwest. Come see what we've found.



David Thompson
Editor & Publisher

WANT ADS

The following folks are reaching you for only 20 cents per word. If you would like to reach the same audience, send your words and 20 cents for each to Micro Cornucopia.

Protect your schematics. Heavy duty vinyl sheet protector, 11X17, 3-hole punched, perfect for BB schematics! Six for \$6.00 postpaid. Tony Ozrelic, LA Software, 6708 Melrose, Los Angeles CA 90038.

Xerox 820 boards completely assembled and tested with documentation. \$150.00 plus shipping. Call evenings 213-340-5410 or write Jiri Kratt, 20311 Sherman Way #316, Canoga Park CA 91306.

Need money for bills. For sale: Z80 CP/M Big Board II (\$800), two Shugart 800's (\$150 each), case and power supply (\$150), 15 MHz monitor (\$50), unwired keyboard. Whole package with CP/M 2.2 for \$1150 plus shipping. Tom Mason, 216-575-8195 days, 216-836-7254 evenings.

Looking for Kaypro users in Japan. Is there anyone here? T.R. Hofmann, Toyama University, Toyama. 0764-41-4038

BB I, dyna-disk, floppy, keyboard, monitor, software \$900. 415-532-7971.

For Sale: Big Board I with all options except serial ports. Modified, running at 4 MHz, RAM power protection circuit \$200. Same mounted in old TI914 terminal with power supply, keyboard, and monitor \$350. Bruce Kinney, 4201 Tynes Dr, Garland TX 75042. 214-276-7650.

Kaypro. Need more workspace? Add 1½ sq. ft. of level workspace right on top of the Kaypro. 18 Ga. steel will support books, even a printer. Adjustable angle. Send \$27 (includes shipping) or a SASE for more info. MetroWest, 822 N Spring, LaGrange Park IL 60525.

Wanted: 1 SDSS 8" drive, 220v/50Hz. Used/working OK. Rex Buddenberg (503) 756-2180 eves/wknd.

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TECHNICAL TIPS

Electronic Prototype Construction

Book Review by David Thompson

This book, Electronic Prototype Construction is supposedly for those of you who build prototypes, and there is some good information on prototyping methods. However, the real strength of this book is its thorough coverage of printed circuit board design and manufacture.

I know that most of you don't lay out printed circuit boards for prototypes but once you have a prototype running it's usually time to generate a board.

This book really opened my eyes to the kinds of problems I would face trying to design, etch, and finish top quality circuit boards. (I've laid out and etched my own PC boards, but quality wise, they stunk.) Also, this book has made it much easier for me to judge the work of the commercial board houses. (Plus, I can now speak their language.)

Chapter 1 covers wire wrapping. Chapters 2 through 10 thoroughly cover printed circuit board design, photography, etching, printing, and machining. Chapter 11 covers system packaging. (You can see the emphasis on printed circuit processes.)

The book is well written and there are many illustrations. Most of the pictures do a good job of illustrating the point. The graphic designer made good use of boldface subheads to help you find a particular piece of information.

Unfortunately, many of the illustrations appear to be stock photos from equipment manufacturers. Stock photos are an inexpensive way to illustrate a text but the poor graphic quality of many of the photos lends a 1950's feeling to the book.

Stephen Kasten, the author, is a chemist by trade so it's not surprising that he is especially knowledgeable about the printed circuit process. I recommend this book to anyone interested in using PC boards on new project.

Electronic Prototype Construction
by Stephen Kasten
Published by Howard W Sams
ISBN 0-672-21895-X
\$17.95 (paperback)



Chess Fix

The chess program on the Kaypro and Big Board user disks outputs characters with bit 7 set. I didn't notice anything unusual on the BB and Kaypro II because they automatically reset (0) that bit before sending characters to the screen (otherwise they'd flash).

Well, the Kaypro 10 doesn't reset that bit so the 10 displays garbage. You can patch the program yourself quite easily. See Figure 1.

Dana Cotant
Micro C

DDT ZCHESS.COM

```

A107 <CR>
107    CALL      1F00 <CR>
10A <CR>
A1F00 <CR>
1F00    MVI      C,02 <CR>
1F02    MOV      E,A <CR>
1F03    RET <CR>
1F04 <CR>
^C

```

SAVE 32 ZZCHESS.COM

Figure 1 - Chess Fix for the Kaypro 10

Xerox 820 Composite Video

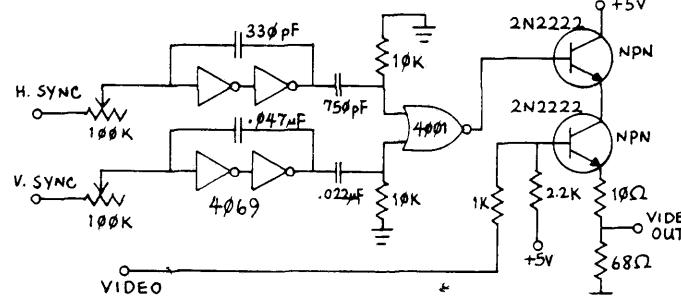
This is a really easy circuit for generating composite video for the Xerox 820. Handle the CMOS ICs carefully, they are sensitive to static. On both the ICs, pin 7 should go to ground, pin 14 should go to +5V. Ground the unused inputs on the 4001. Keep the sync and video leads from the 820 short. I used 6" hook up wire. See Figure 3.

Most of the components are available from Radio Shack.

Also, those of you building up 820 systems, remember to ground pin 2 on J1 if you are running 5" drives and leave it open (or pull it high) if you are running 8" drives.

Herb Graeber
3604 Meadow Oaks
Bryan, TX 77801

Figure 3 - Xerox 820 Composite Video



Using Monostables

Avoid monostables of the 123 variety (74S123 . . .). Use a 538 (such as a 14538B). Tolerances on the 123 are 35%, on the 538 they are 1%. The 538s are not pin compatible with the 123s.

You can hide the problems with the 123s by using large mica capacitors with small resistors to get the same time constant. That hides the current leakage in the 123.

Controlling Frequency Response

I sometimes see caps to quiet noise on transistor bases or IC leads. The capacitors connect between the leads and ground (see C1 in Figure 2). However, since every device has some input capacitance, a series resistor can do the same thing (see R1 and R2 in Figure 2). A 33 ohm resistor in the base of a 2N2222 will give a frequency roll off starting at about 20 MHz, 10K ohms in the same place will make the transistor look like a Lo-Fi audio unit. If you have high impedance leads that are picking up near-by radio stations, try the resistor fix.

A quick note: I'd like to see little single-subject paper backs for beginners on such subjects as: DUMP, DDT, MOV-CPM, XAMN . . . Add lots of examples so one can get the details quickly and easily.

Harvey DeGering
1245 E Washington Blvd
Pasadena CA 91104

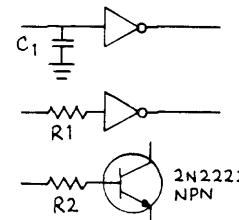


Figure 2 - Controlling Frequency Response

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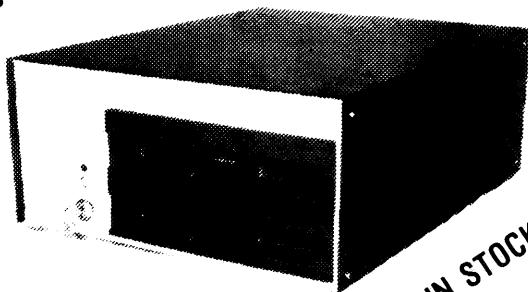
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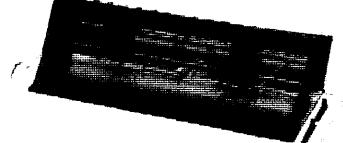
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Kaypro ROMs from Micro Cornucopia

There are two ROMs in each Kaypro a monitor ROM and a character ROM. The Monitor ROM supplies information for the Z80 processor on such things as how to get information from the disk drives, and which character to use as a cursor. The character ROM works entirely in the video circuit and it determines what the characters look like on the screen (for instance, does the "I" have a high, small cross bar, or a lower, longer one of the Micro C character ROM). When you speed up your Kaypro, you are speeding up the processor clock so you have to use monitor ROM that will also run at the higher speed. You are not changing the video clock when you speed up the Kaypro so you don't need to change the character ROM (unless you want the nicer looking character set). Since the monitor ROM tells the processor how to do disk accesses you are going to have to change that ROM in order to upgrade to larger drives.

Pro-Monitor II for Kaypro II

1. This ROM is a fast part so you can run 4 or 5 MHz with your Kaypro II.
2. It gives you a non-blinking block cursor (much less irritating), though you can specify a standard blinking underline if you prefer it.
3. It does faster disk accesses (even if you don't speed up your system).
4. It throws away null characters (those little asterisks that sometimes garble the screen during data communications).
5. Includes complete printed instructions for simple plug-in installation. (takes 5 minutes).

Pro-Monitor 4 for Kaypro 4

This ROM does everything the Pro-Monitor II does, only it's for a Kaypro 4. Though the ROM that comes in your Kaypro 4 will run 4 or 5 MHz (unlike the ROM that comes in the II), this ROM also gives you:

1. Non-blinking block cursor.
2. Faster disk accesses.
3. Throws away null characters.
4. Complete printed instructions for simple plug-in installation (takes 5 minutes).

Prices:

Pro-Monitor II	29.95
Pro-Monitor 4	29.95
Pro-Monitor 8 (package)	49.95
Pro-Character (either Greek or Clean)	29.95
Pro-Set II (Pro-Monitor II & Pro-Character)	55.00
Pro-Set 4 (Pro-Monitor 4 & Pro-Character)	55.00
Pro-Set 8 (Pro-Monitor 8 package & Pro-Character)	70.00

Pro-Monitor 8 package for Kaypro 4

This ROM package does everything the Pro-Monitor II and 4 do (it will run at 5 MHz, ignores nulls, has the fast disk accesses). In fact, even if you are just upgrading your II to a 4 (and will be using the 390 K drives for now) you can use this ROM package. The Pro-Monitor 8 features include:

1. You get 784K per disk with quad density (96 tpi, double sided) Tandon 100-4 (or equivalent) drives.
2. You can use any combination of Tandon 100-1 (Kaypro II), 100-2 (Kaypro 4), or 100-4 drives as drives A and B.
3. You can boot from any disk with normal system tracks (Kaypro II, Kaypro 4, or Kaypro 8). The disk needs no modification.
4. You can choose any character (including space) as a cursor and you can choose to make the character blink or not blink. Plus, you can change the cursor at will.
5. You get a disk which contains a new copy routine for copying and formatting 784K disks, and a drive diagnostic routine for checking out the quad density drives.
6. You get complete printed instructions for installation of ROM and drives (takes 10 to 15 minutes, including drives).
7. The installation requires no cuts or jumpers, everything simply plugs into a Kaypro 4. (If you have a Kaypro II, see the modification article in Micro C issue 15 to turn your II into a 4.)

Pro-Character ROM (for Kaypro II and 4)

The character ROM gives you a nicer looking character set. Kaypros have come with two different character ROMs, the early character ROMs had a rotten g, y, q, f, and t as well as commas and semi-colons that were hard to tell from periods and colons. On the newer systems (manufactured since Sept 83) half of the characters (notably the g) have been improved, but they haven't gone all the way.

Also, many of the older character ROMs were poor quality parts so they generated snow as information scrolled up the screen. This white flecky snow disappears when you install a Pro-Character ROM.

The character ROM comes in two flavors:

1. The standard Greek Pro-Character has the nicer character set plus the standard Kaypro Greek characters.
2. The Clean Pro-Character has the nicer character set but no Greek characters. This is the ROM for people who get strange Greek characters on the screen when interfacing with Mainframe systems.
3. Complete printed instructions for simple plug-in installation (takes 5 minutes).

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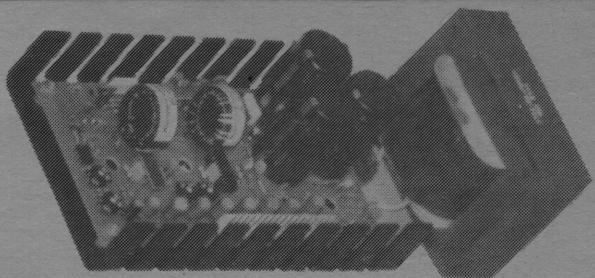
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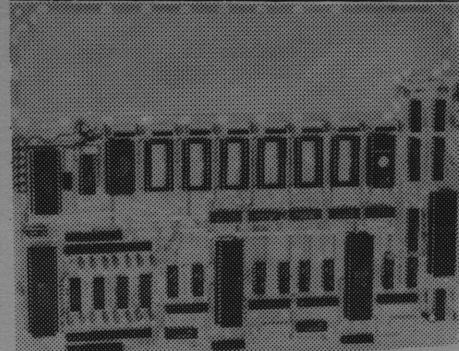
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